

**TOXECON™ RETROFIT FOR MERCURY AND
MULTI-POLLUTANT CONTROL ON THREE
90-MW COAL-FIRED BOILERS**

**Quarterly Technical Progress Report
Reporting Period: January 1, 2006 – March 31, 2006
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**Prepared by
Steven T. Derenne
Wisconsin Electric Power Company
333 West Everett Street
Milwaukee, WI 53203**

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**Theodore J. McMahon
USDOE Contracting Officer's Representative**

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ABSTRACT

With the Nation's coal-burning utilities facing tighter controls on mercury pollutants, the U.S. Department of Energy is supporting projects that could offer power plant operators better ways to reduce these emissions at much lower costs. Sorbent injection technology represents one of the simplest and most mature approaches to controlling mercury emissions from coal-fired boilers. It involves injecting a solid material such as powdered activated carbon into the flue gas. The gas-phase mercury in the flue gas contacts the sorbent and attaches to its surface. The sorbent with the mercury attached is then collected by a particulate control device along with the other solid material, primarily fly ash.

We Energies has over 3,200 MW of coal-fired generating capacity and supports an integrated multi-emission control strategy for SO₂, NO_x, and mercury emissions while maintaining a varied fuel mix for electric supply. The primary goal of this project is to reduce mercury emissions from three 90-MW units that burn Powder River Basin coal at the We Energies Presque Isle Power Plant. Additional goals are to reduce nitrogen oxide (NO_x), sulfur dioxide (SO₂), and particulate matter (PM) emissions, allow for reuse and sale of fly ash, demonstrate a reliable mercury continuous emission monitor (CEM) suitable for use in the power plant environment, and demonstrate a process to recover mercury captured in the sorbent. To achieve these goals, We Energies (the Participant) will design, install, and operate a TOXECON™ system designed to clean the combined flue gases of Units 7, 8, and 9 at the Presque Isle Power Plant.

TOXECON™ is a patented process in which a fabric filter system (baghouse) installed downstream of an existing particle control device is used in conjunction with sorbent injection for removal of pollutants from combustion flue gas. For this project, the flue gas emissions will be controlled from the three units using a single baghouse. Mercury will be controlled by injection of activated carbon or other novel sorbents, while NO_x and SO₂ will be controlled by injection of sodium-based or other novel sorbents. Addition of the TOXECON™ baghouse will provide enhanced particulate control. Sorbents will be injected downstream of the existing particle collection device to allow for continued sale and reuse of captured fly ash from the existing particulate control device, uncontaminated by activated carbon or sodium sorbents.

Methods for sorbent regeneration, i.e., mercury recovery from the sorbent, will be explored and evaluated. For mercury concentration monitoring in the flue gas streams, components available for use will be evaluated and the best available will be integrated into a mercury CEM suitable for use in the power plant environment. This project will provide for the use of a control system to reduce emissions of mercury while minimizing waste from a coal-fired power generation system.

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EXECUTIVE SUMMARY

Wisconsin Electric Power Company (We Energies) signed a Cooperative Agreement with the U.S. Department of Energy (DOE) in March 2004 to fully demonstrate TOXECON™ for mercury control at the We Energies Presque Isle Power Plant. The primary goal of this project is to reduce mercury emissions from three 90-MW units (Units 7, 8, and 9) that burn Powder River Basin (PRB) coal. Additional goals are to reduce nitrogen oxide (NO_x), sulfur dioxide (SO₂), and particulate matter (PM) emissions, allow for reuse and sale of fly ash, demonstrate a reliable mercury continuous emission monitor (CEM) suitable for use in the power plant environment, and demonstrate a process to recover mercury captured in the sorbent.

We Energies has teamed with ADA-ES, Inc., (ADA-ES) and Cummins & Barnard, Inc., (C&B) to execute this project. ADA-ES is providing engineering and management on the mercury measurement and control systems. Cummins & Barnard is the engineer of record and will be responsible for construction, management, and start-up of the TOXECON™ equipment.

This project was selected for negotiating an award in January 2003. Preliminary activities covered under the “Pre-Award” provision in the Cooperative Agreement began in March 2003. This quarterly report summarizes progress made on the project from January 1, 2006, through March 31, 2006. During this reporting period, work was conducted on the following tasks:

- Task 7. Procure Mercury Continuous Emissions Monitor (CEM) Package and Perform Engineering and Performance Assessment.
- Task 10. Erect Structural Steel, Baghouse, and Ductwork.
- Task 13. Equipment Pre-Operational Testing.
- Task 14. Start Up and Operator Training.
- Task 15. Operate, Test, Data Analysis, and Optimize TOXECON™ for Mercury Control.
- Task 19. Reporting, Management, Subcontracts, Technology Transfer.

INTRODUCTION

DOE awarded Cooperative Agreement No. DE-FC26-04NT41766 to We Energies to demonstrate TOXECON™ for mercury and multi-pollutant control, a reliable mercury continuous emission monitor (CEM), and a process to recover mercury captured in the sorbent. Under this agreement, We Energies is working in partnership with the DOE.

Quarterly reports will provide project progress, results from technology demonstrations, and technology transfer information.

Project Objectives

The specific objectives of this project are to demonstrate the operation of the TOXECON™ multi-pollutant control system and accessories, and

- Achieve 90% mercury removal from flue gas through activated carbon injection
- Evaluate the potential for 70% SO₂ control and trim control of NO_x from flue gas through sodium-based or other novel sorbent injection
- Reduce PM emission through collection by the TOXECON™ baghouse
- Recover 90% of the mercury captured in the sorbent
- Utilize 100% of fly ash collected in the existing electrostatic precipitator
- Demonstrate a reliable, accurate mercury CEM suitable for use in the power plant environment
- Successfully integrate and optimize TOXECON™ system operation for mercury and multi-pollutant control

Scope of Project

The "TOXECON™ Retrofit for Mercury and Multi-Pollutant Control on Three 90-MW Coal-Fired Boilers" project will be completed in two Budget Periods. These two Budget Periods are:

Budget Period 1: Project Definition, Design and Engineering, Prototype Testing, Major Equipment Procurement, and Foundation Installation. Budget Period 1 initiated the project with project definition activities including NEPA, followed by design, which included specification and procurement of long lead-time major equipment, and installation of foundations. In addition, testing of prototype mercury CEMs was conducted. Activities under Budget Period 1 were completed during 1Q05.

Budget Period 2: CEM Demonstration, TOXECON™ Erection, TOXECON™ Operation, and Carbon Ash Management Demonstration. In Budget Period 2, the TOXECON™ system will be constructed and operated. Operation will include optimization for mercury control, parametric testing for SO₂ and NO_x control, and long-term testing for mercury control. The

mercury CEM and sorbent regeneration processes will be demonstrated in conjunction with the TOXECON™ system operation.

The project continues to move through Budget Period 2 as of the current reporting period. Each task is described in the Statement of Project Objectives (SOPO) that is part of the Cooperative Agreement.

EXPERIMENTAL

None to report.

RESULTS AND DISCUSSION

Following are descriptions of the work performed on project tasks during this reporting period.

Task 1 – Design Review Meeting

Work associated with this task was previously completed.

Task 2 – Project Management Plan

Work associated with this task was previously completed.

Task 3 – Provide NEPA Documentation, Environmental Approvals Documentation, and Regulatory Approval Documentation

Work associated with this task was previously completed.

Task 4 – Balance of Plant (BOP) Engineering

Work associated with this task was completed during 1Q05 in Budget Period 1.

Task 5 – Process Equipment Design and Major Equipment Procurement

Work associated with this task was completed during 1Q05 in Budget Period 1.

Task 6 – Prepare Construction Plan

Work associated with this task was completed during 1Q05 in Budget Period 1. The Construction Plan was issued on January 26, 2005.

Task 7 – Procure Mercury Continuous Emission Monitor (CEM) Package and Perform Engineering and Performance Assessment

The overall goal of this task is to have a compliance-grade, reliable, certified mercury CEM installed and operational for use in the TOXECON™ evaluation. ADA-ES has teamed with Thermo Electron Corporation on this task. The Thermo Electron CEM was described in detail in a previous Quarterly Report (DOE Report No. 41766R05).

CEM Update

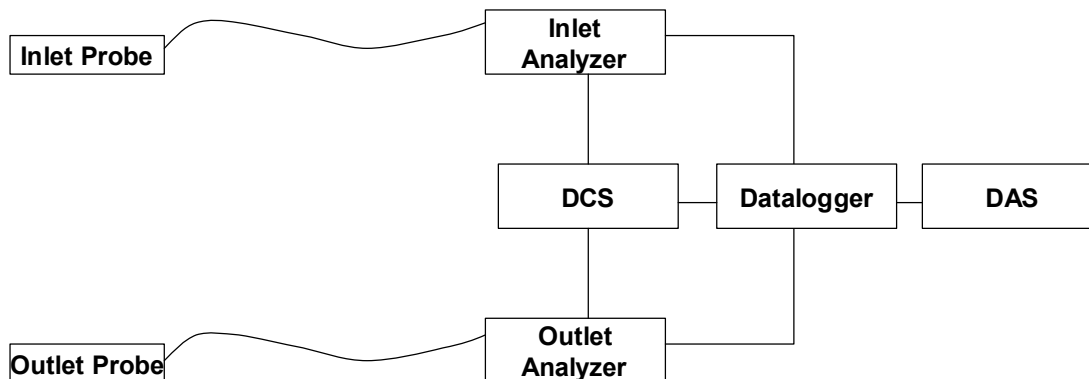
Several activities were completed this quarter:

- Successful operation of the two commercial, i-series mercury CEMs at the inlet and outlet of the baghouse. The inlet analyzer is sampling from the duct at the outlet of Unit 8 air preheater.
- Integration of the two CEMs with an ESC data logger and the plant DCS system.

Site Progress

On June 30, 2005, a beta version (c-series) Thermo Electron CEM was installed at the outlet of the air preheater on Unit 8. Two new i-series Mercury Freedom™ CEMs were installed in December 2005, one replacing the beta CEM and one at the outlet duct of the baghouse. Data from the two CEMs are shown in Task 15 as part of the TOXECON™ testing.

During the week of January 10, 2006, the inlet and outlet mercury CEMs were integrated into the plant DAS and DCS system. A sketch showing the primary connections is shown in Figure 1. The mercury CEMs are connected through an ESC datalogger that controls the daily zero and span checks on the same schedule as the other plant CEMs. Mercury concentrations and status information is stored on the plant DAS with other plant CEM data. The mercury concentration output from the mercury CEM was also connected directly into the plant DCS system to allow feedback control of the sorbent injection system in the future.



DCS: Process Control

Hg concentration from CEM

Average concentration and emission rate with data validation from datalogger

DAS: “Compliance” Record

Figure 1. Sketch of Mercury CEM Integration into DAS and DCS.

On January 24, the hot lines were installed for sampling mercury from Units 7 and 9. The tie-in will be the same as currently installed on Unit 8. Two corresponding penetrations into

the inlet CEM shelter were installed to accommodate these hot lines. The probes for these hot lines are scheduled to be installed in 2Q06.

Both mercury CEMs are calibrated daily and records of the zero checks, span checks, and calibrations are recorded. A summary of this data with a discussion of CEM operation will be included in the second quarter 2006 report.

Task 8 – Mobilize Contractors

Contractor mobilization was completed in 2Q05.

During this period, the remainder of CaTS personnel completed their assignments and CaTS Construction Management Team demobilized from the site.

Jamar, Boldt, Northland Electric, United Anco, PCI, Wheelabrator and CaTS demobilized from the site in 4Q05.

Task 9 – Foundation Erection

All Major foundation work by Boldt Construction Co. was completed during 1Q05.

Task 10 – Erect Structural Steel, Baghouse and Ductwork

The erection work associated with task was initiated during 2Q05.

The work effort for this task during the 1st quarter of 2006 was limited to final exception/punch list item work, with the exception of final insulation/lagging installation. Some minor access platform work to address exception/punch list items was also initiated during this quarter. Other items included contractor demobilization, final cleanup and Construction Management Team demobilization.

Task 11 – Balance of Plant Mechanical and Civil/Structural Installations

Primary work associated with this task was completed in 4Q05. Exception/punch list item completion was the primary focus during 1Q06.

Task 12 – Balance of Plant Electrical Installations

Primary work associated with this task was completed in 4Q05. Exception/punch list item completion was the primary focus during 1Q06.

Task 13 - Equipment Pre-Operational Testing

Pre-operational testing was completed in 4Q05.

Task 14 – Start-Up and Operator Training

Startup of all major equipment was completed in 4Q05. Final O&M manuals were received for most major equipment in 2005.

The operator training program was completed during 4Q05 to train the plant operations personnel.

The baghouse was initially brought into operation on December 17 with flue gas from Unit 7. Initial operation with Unit 8 occurred on January 5, 2006 and Unit 9 on January 27, 2006.

PAC System Checkout

A meeting was held in January with We Energies and ADA-ES to discuss PAC injection control strategies. Based on the meeting, the plant is developing the following five control strategies:

- Constant Rate Injection
- Feedback w/ Hg removal efficiency as a setpoint.
- Feedback w/ Hg outlet as a setpoint.
- Feedback w/ Hg inlet as a setpoint.
- Batch Injection – this strategy is in its infant stages and will be developed over time.

The PAC silo and injection system was started and checked in January 2006. PAC was delivered 10:30 am Thursday, January 26. There was no sign of leakage from the silo during or after transport of PAC from the truck to the silo. The vent filter worked well.

The PAC injection system checkout included the following:

- Bumped all motors and checked for proper rotation.
- Meggered all (6) 480 VAC motors.
- Started all (3) injection trains on the PAC System (i.e., Unit 7, 8, 9). Calibrated all (3) trains and the maximum feed rate for each of the trains were 190 lb/hr, 190 lb/hr and 220 lb/hr. The difference in maximum feed rate may be attributed to material flow characteristics at the time.
- Tested the maximum conveying rates for all (3) injection trains. With the existing metering augers, the maximum injection rate was 100% of the feeder speed. The eductor is sized such that, the plant should have no problem feeding between 5-100% of the feeder demand.

The first PAC injection started on January 27 at 2:35 pm. This was injection only into Unit 7 duct. The injection continued until 6:30 pm at varying injection rates. There was no noticeable increase in pressure drop in the baghouse during injection. The outlet mercury concentration went from 5.0 ug/m³ to 2.1 ug/m³.

PAC injection was started at 9:45 am on January 28. All three injection trains were used. Each unit was brought up to 100% feed rate while the other two were kept at 10%. After this, the PAC injection was kept at 10% on all three trains. Injection stopped at 11:30 am and resumed at 12:45 pm. The injection rate in the afternoon was 10% in each train.

The PAC feeders were calibrated on January 28. Table 1 shows that they were injecting less than originally calculated. The new calibration factors to convert percent feeder speed to actual feed rates were changed in the DCS logic.

Table 1. PAC Injection System Calibration

Unit	Feed Rate (%)	Assumed Feed Rate (lb/hr)	Sample Weight (lb)	Sample Time (min)	Actual Feed Rate (lb/hr)	Differential (%)
7	5	15	1.375	10	8.25	55.00
7	10	30	3.125	10	18.75	62.50
7	20	60	7.625	5	37.50	62.50
7	50	150	8.250	5	99.00	66.00
7	75	225	7.500	3	150.00	66.67
8	10	30	3.250	10	19.50	65.00
8	20	60	3.750	6	37.50	62.50
8	50	150	5.000	3	100.00	66.67
9	10	30	4.000	10	24.00	80.00
9	20	60	4.375	6	43.75	72.92
9	50	150	5.625	3	112.50	75.00

Task 15 – Operate, Test, Data Analysis and Optimize TOXECON™ for Mercury Control

On December 17, the baghouse was put into service with flue gas from Unit 7. Unit 9 was added on January 5 and Unit 8 on January 27, 2006.

TOXECON™ testing officially began after check out of the PAC system. Figure 2 shows tube sheet pressure drop for all ten compartments and inlet and outlet mercury concentrations for the time period covering PAC startup and up to baseline testing. The data shows mercury removal during PAC startup and cycling of the PAC feeders as the system was checked out. The data also show that tube sheet pressure drop increases by over a half inch W.C. from the front compartments (1 and 6) to the back compartments (5 and 10). This differential may decrease as the baghouse seasons with continued operation.

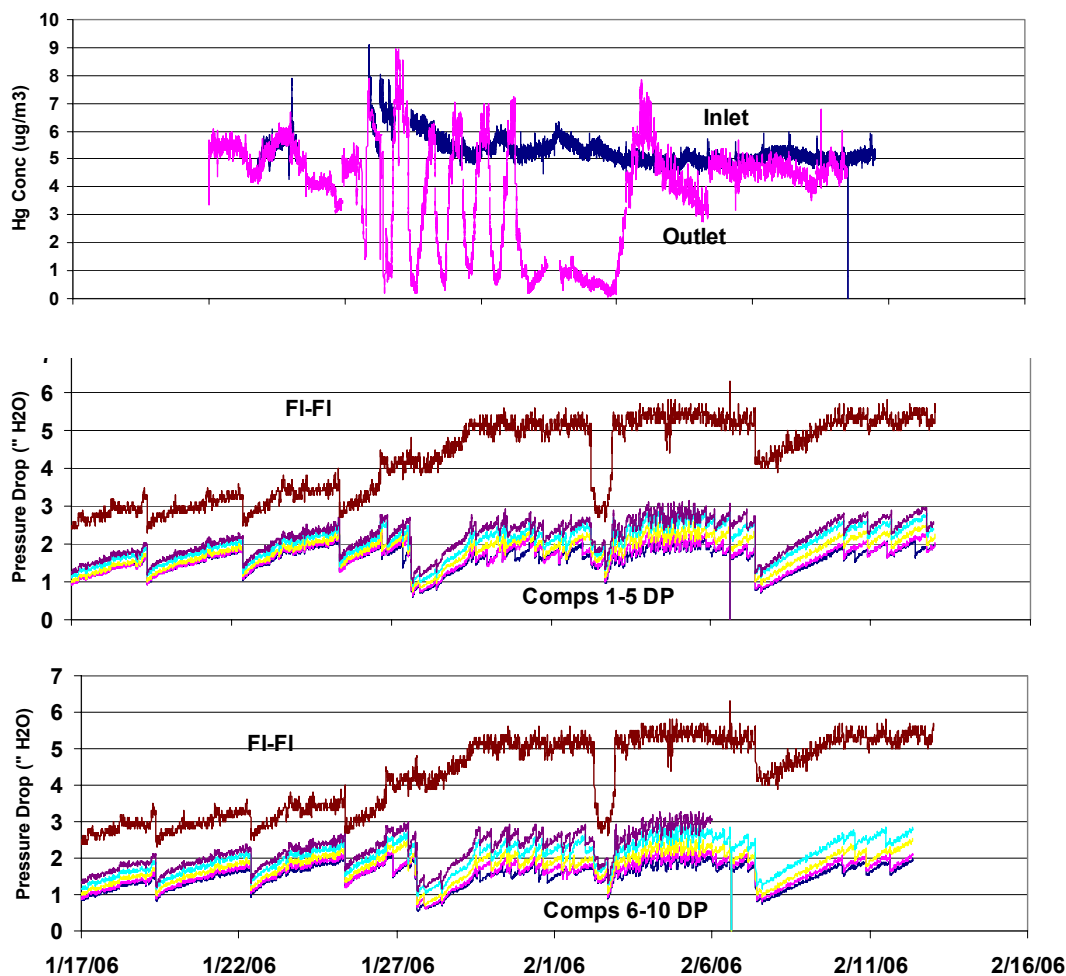


Figure 2. Inlet and outlet mercury concentrations and baghouse pressure drop, January 17 – February 12, 2006.

Baseline Tests (February 13 – February 16)

Baseline tests were performed during the week of February 13. Baseline testing was done without PAC injection. Efforts during this week included sampling of coal and ash, monitoring the CEMs and plant data, and performing mercury, halogen, and particulate testing on the flue gas into and out of the baghouse.

Flue Gas Testing

GE Energy was contracted by ADA-ES to measure flue gas constituents at the inlet and outlet of the baghouse. On February 14, 15 and 16 they conducted manual measurements per the test plan, which included:

- Ontario Hydro measurements for mercury at the common inlet and outlet duct;
- Sorbent trap (Method 324) measurements for mercury at the outlet of the air heater in each individual duct and the common outlet duct;
- Method 5 for particulate loading at the common inlet and outlet ducts; and
- Method 26A for halogens at the common outlet duct.

The report from GE Energy is attached as Appendix A.

Flue Gas Temperature Measurements

During baseline testing GE Energy performed various flue gas measurements. As part of the traverse process for the Ontario Hydro Method, flue gas temperatures were taken at 24 points at both the inlet and outlet duct to the baghouse (Figure 3).

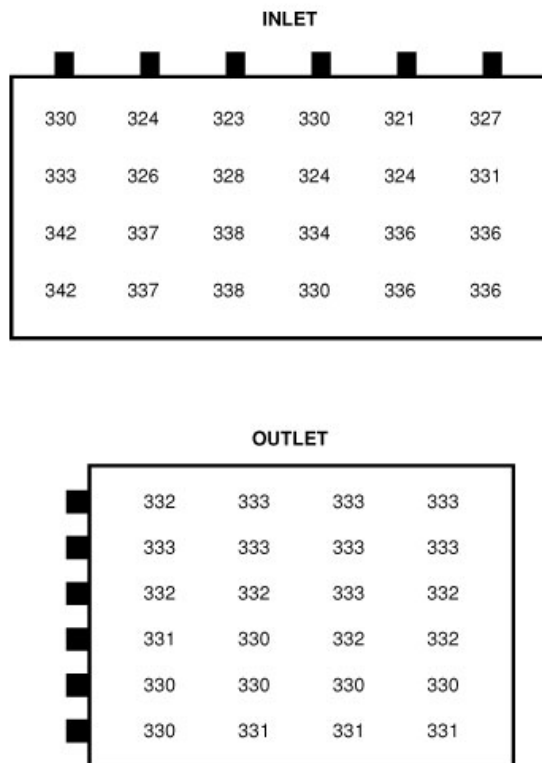


Figure 3. Baghouse Temperature Profile.

The results and comparison with the plant temperature data from the EDS are shown in Table 2. The overall comparison between the plant data and the GE data shows very little difference between maximum and minimum, especially considering that the GE data was taken in 5 minute intervals and not simultaneously.

Table 2. Flue Gas Temperature Comparison

GE Energy Temperature DATA Profile in Ducts from 9:25 a.m. to 12:00 noon on 2-14-06				
	Inlet Min.	Inlet Max.	Outlet Min.	Outlet Max.
GE Energy	324	342	330	333
EDS	332	339	326	334

Particulate Measurements

A total of 24 test points were sampled using six ports at the baghouse common inlet and outlet test locations. The particulate sample trains met all specifications required by Method 5, 40CFR60. The filter media were Whatman 934-AH glass microfibre filters exhibiting a >99.97% efficiency on 0.3 micron particles. Triplicate sampling was performed at the inlet and outlet. Table 3 shows the results of this study. The average removal across the baghouse was 99.6%, with an emission rate of 0.00011 lb/MMBtu.

Table 3. Particulate Removal across the Baghouse

Run #	Inlet (lb/hr)	Outlet (lb/hr)	Removal (%)
1	84.868	4.179*	
2	104.438	0.368	
3	141.192	0.556	
Average	110.166	0.462	99.6%

*Not included in average due to inconsistency

Hydrogen Halide and Halogen Measurements

Hydrogen chloride (HCl), hydrogen bromide (HBr), bromine (Br₂) and chlorine (Cl₂) concentrations were determined using Method 26A, 40CFR60. Three integrated twenty-four-point samples were extracted from the common outlet gas stream. The inlet was not measured. Table 4 lists the results of these measurements.

Table 4. Hydrogen Halide and Halogen Measurements

Run #	HCl (ppm)	HBr (ppm)	Cl₂ (ppm)	Br₂ (ppm)
1	3.79	0.16*	0.00	0.00
2	3.90	0.00	0.00	0.00
3	3.73	0.00	0.00	0.00
Average	3.81	0.00	0.00	0.00

*Not included in average due to inconsistency

Mercury Measurements

A total of 24 test points were sampled using six ports at the baghouse common inlet and outlet test locations. The speciated mercury sample trains met all specifications required by the Ontario Hydro method. Triplicate tests were performed at the inlet and outlet. Figure 4 shows how the Ontario Hydro measurements compare with the Thermo CEM.

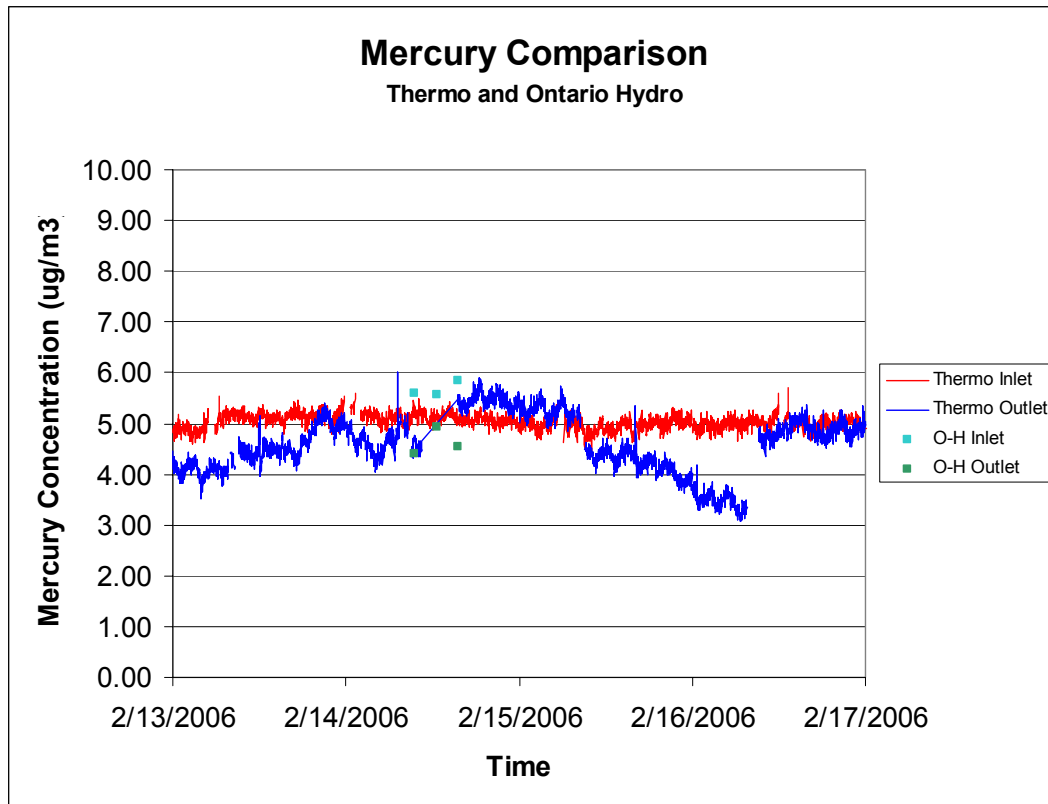


Figure 4. Thermo CEM and Ontario Hydro Measurements

Table 5 shows the average inlet and outlet measurements from 10 am through 4 pm using the Thermo CEM and comparing with the Ontario Hydro Method. There was a 0.6% difference between inlet and outlet based on the CEM, but 9% when using the Ontario Hydro Method. The CEM and the Ontario Hydro results differed by 12% and 4.6%, which is well within the 20% agreement required by EPA to pass the Relative Accuracy Test Audit (RATA) for mercury.

Table 5. Comparison of Thermo CEM and Ontario Hydro Data

Test Method	Inlet Average ($\mu\text{g}/\text{sm}^3$)	Outlet Average ($\mu\text{g}/\text{sm}^3$)	Differential (%)
Thermo CEM	4.99	4.96	0.6%
Ontario Hydro	5.67	5.20	9.0%
Differential (CEM & O-H)	12%	4.6%	

Based on the Ontario Hydro data, the elemental mercury at the inlet was 91% of the total and oxidized was the balance, with just a trace of the mercury particle-bound. At the outlet, the elemental portion was 88%, with the remainder in the oxidized form.

Vapor phase mercury emissions were also measured in accordance with the USEPA Draft Method 324. A single point was used for paired train sorbent sampling at the outlet of the air preheaters of units 7, 8, and 9, and the common baghouse outlet. Sorbent traps included main and backup sections in series. The sorbent trap was supported on a probe and inserted directly into the flue gas stream. Sampling was performed at a constant rate of approximate 0.4 l/min for a period of two hours. Table 6 gives the results of these tests. There was considerable variation between the triplicate tests as well as between inlet and outlet. GE Energy stated that they were having difficulty with the connections with the sorbent traps during the tests. Some traps were very difficult to separate and others separated unintentionally during assembly, and in one case sampling. This lack of consistency brings into question the usefulness of these results.

Table 6. Method 324 Results

Sample Location	Run #1 Conc. (µg/sm³)	Run #2 Conc. (µg/sm³)	Run #3 Conc. (µg/sm³)	Average Conc. (µg/sm³)
Unit 7	0.86	0.66	0.62	0.71
Unit 8	0.65	0.54	4.45	1.88
Unit 9	15.66	40.85	15.59	24.04
Outlet	2.55	4.66	4.89	4.04

Performance Data

Data was downloaded from the Thermo CEMs and the EDS for the week of baseline testing. Figure 5 shows inlet and outlet mercury concentrations, flange-to-flange pressure drop and inlet temperature. There was some drift on the outlet CEM because the calibration routine was not programmed properly. When this was corrected and the instrument began undergoing daily calibrations, the mercury levels returned to the expected values.

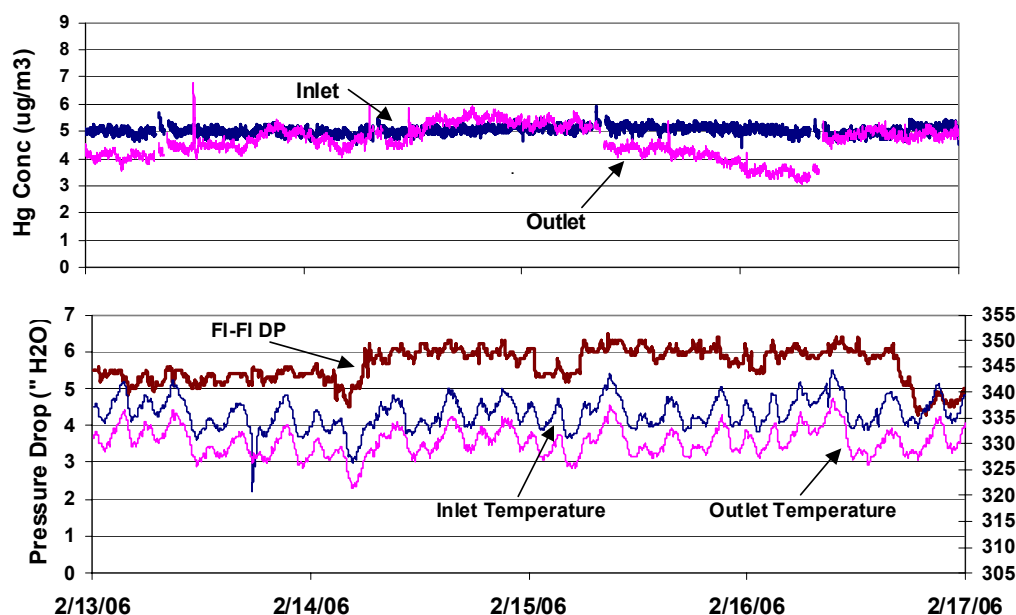


Figure 5. Inlet and outlet mercury concentrations and baghouse pressure and temperature, February 13 – February 17, 2006.

Sample Collection and Analysis

During baseline testing, coal and ash samples were collected from the coal feeders on Units 7-9, the hot-side ESP ash hoppers and the TOXECON™ baghouse hoppers. The goal for this sampling campaign was to collect sufficient samples to determine:

1. Variations in coal mercury concentration between the three units and between the four feeders on each unit;
2. Mercury concentration in the ash collected in the hot-side ESPs; and
3. Mercury concentration in and variation between hoppers of the ash collected by the TOXECON™ baghouse.

The following table lists the samples collected:

Table 7. Coal and Ash Sampling Schedule - Baseline

Sample	Location	Dates	# Samples
Coal	Feeders A1, A2, B1, B2 on Units 7-9	2/14-2/16/06 (12 samples per day)	36 total
ESP Ash	Unit 7 hoppers (A-L)	2/14/06	12
ESP Ash	Unit 8 hoppers (A-L)	2/15/06	12
ESP Ash	Unit 9 hoppers (A-L)	2/16/06	12
Baghouse Ash	Hoppers 1-10	2/14-2/16/06 (10 samples per day)	30 total

Samples were shipped to ADA-ES, where portions of the samples were analyzed. Depending on the analysis, samples were analyzed either by ADA-ES or sent to outside laboratories for the appropriate testing. Not all samples taken were analyzed, but all of them are stored for future analyses, if needed. Table 8 lists the analyses scheduled for the samples.

Table 8. Coal and Ash Analysis Schedule - Baseline

Sample	Analysis
Coal	Ultimate, Proximate, Hg, Cl
ESP Ash	Loss on Ignition (LOI) and Hg
Baghouse Ash	LOI and Hg

Table 9 shows some of the results from the baseline tests on the coal and ash. Details of the individual test results received to date are shown in Appendix B. The following table does not list the results from the ultimate and proximate tests due to space constraints.

Table 9. Coal and Ash Results – Baseline

Sample and Test	Results
Coal Hg	35-89 ng/g
Coal Cl	43-116 µg/g
ESP Ash Hg	<10 ng/g
ESP Ash LOI	0.61 – 1.5%
Baghouse Ash Hg	1790 – 14100 ng/g
Baghouse Ash LOI	6 - 18% (after PAC startup testing)

Typical LOI values for the ESP ash were below 1%. The results from the baghouse ash were higher since there was residual PAC from the startup operations. The mercury level in the baghouse ash was also much higher due to the residual PAC from startup. There was no apparent pattern between coal feeders based on the mercury and chlorine results.

Baghouse Cleaning Cycle

Baghouse cleaning was set to initiate a clean @ 6.5” W.C. or every 72 hours. Each clean consisted of pulsing 6 of the 36 pulse pipes in each compartment until the pressure drop decreased by 0.5” W.C., when cleaning was stopped. On the next cleaning cycle, the pulsing picked up where it left off. During any cleaning cycle all of the pipes in every compartment may or may not be pulsed.

Parametric Testing (February 20 – March 1)

Parametric testing was scheduled to begin February 20, 2006. The overall goal of these tests was to establish a correlation between injection of DARCO Hg and mercury removal. Secondary goals included understanding the variables that impact mercury removal performance and to document any changes in baghouse performance. Table 10 summarizes the proposed test conditions.

To minimize variables, it was decided to operate the baghouse at a pressure drop of nominally 6" W.C. and use a cleaning logic that was similar to baseline testing. It was also agreed that a parametric test would be considered complete when the mercury removal reached a level $\pm 5\%$ for 24 hours.

Table 10. Parametric Test Conditions with DARCO Hg

Inj. Conc. (lbs/MMacf)	Feedrate (lbs/h)	Comments
0.5	30	Establish baseline with PAC
3.0	180	Build up DP (at this rate for ~8 h)
0.5	30	
1.0	60	
1.5	90	
2.0	120	
2.5	150	
3.0	180	
2.0	120	Evaluate high temp operation
TBD	TBD	Evaluate cleaning sequence equalize comp DP's

Prior to parametric testing, the baghouse was put through one complete cleaning cycle to remove residual dust cake that was formed when the units were being brought on line. This was done by initiating a manual clean cycle six times to ensure every pipe in every compartment was pulsed. The flange-flange (fl-fl) pressure drop decreased to nominally 4.5 inches W.C.. To increase the fl-fl pressure to the target of 6.0 inches W.C., PAC injection was started on February 17 at 0.5 lbs/MMacf but there were problems with the ash unloader so PAC injection was discontinued over the weekend. On Monday February 20, the injection was resumed at a relatively high rate of 3 lbs/MMacf and then lowered as pressure drop increased. The effect of these injection rates can be seen in Figure 6.

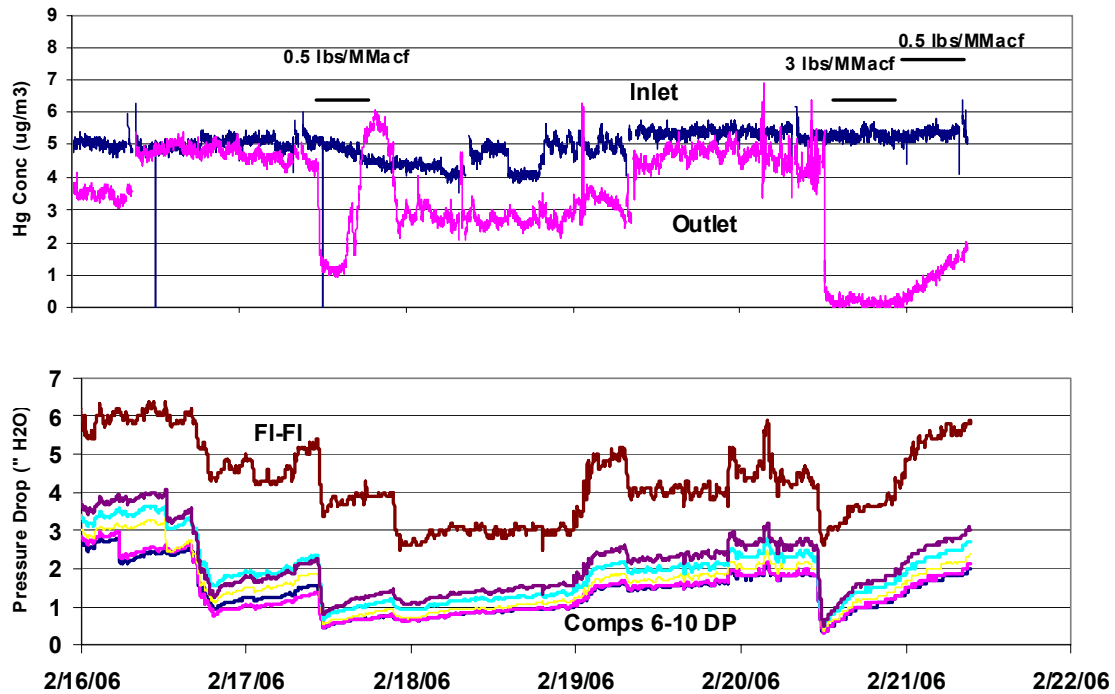


Figure 6. Inlet and outlet mercury concentrations and baghouse pressure drop, February 16 – February 21, 2006.

A log of parametric and operational changes can be found in Table 11.

Table 11. Operation Log During Parametric Tests

Date	Time	PAC Inj (lb/MMacf)	Operation Log
2/16/06	16:00	0	Initiate 6 clean cycles (1 full clean)
2/17/06	11:15	0.5	Cleaning completed, start PAC injection
2/17/06	15:23	0	Ash unloader broken, no PAC injection until fixed
2/19/06	23:08	0	One mill on Unit 9 offline
2/20/06	7:50	3	Increase carbon injection rate to build DP
2/20/06	16:35	0.5	Lower injection rate to begin parametric tests
2/21/06	00:12	0.5	Mill on Unit 9 came back on line
2/23/06	5:30	0.8	Control glitch caused increase in PAC rate
2/23/06	8:00	1.0	Increase to second parametric test condition
2/24/06	21:20	0.45	Control glitch caused decrease in PAC rate
2/25/06	4:18	0.5	Control glitch caused increase in PAC rate
2/25/06	6:45	1.5	Increase to third parametric test condition
2/27/06	8:30	2.0	Increase to fourth parametric test condition

Performance Data

On February 20 PAC injection was set at 0.5 lbs/MMacf. By February 22, outlet mercury concentration leveled out. This gradual increase in outlet mercury was caused by the residual carbon on the bags from operation at 3 lbs/MMacf. As the carbon capacity was used up, the mercury removal rate decreased until a quasi-equilibrium was reached on February 22. At this condition, outlet mercury cycled between about 2.5 and 4.8 $\mu\text{g}/\text{m}^3$; these changes can be seen in Figure 7. After considering several variables that could affect outlet mercury concentration, including temperature, flow, pressure drop, pulse cleaning, carbon feed and hopper ash pulling, it became apparent that outlet mercury concentration was mainly varying with inlet flue gas temperature.

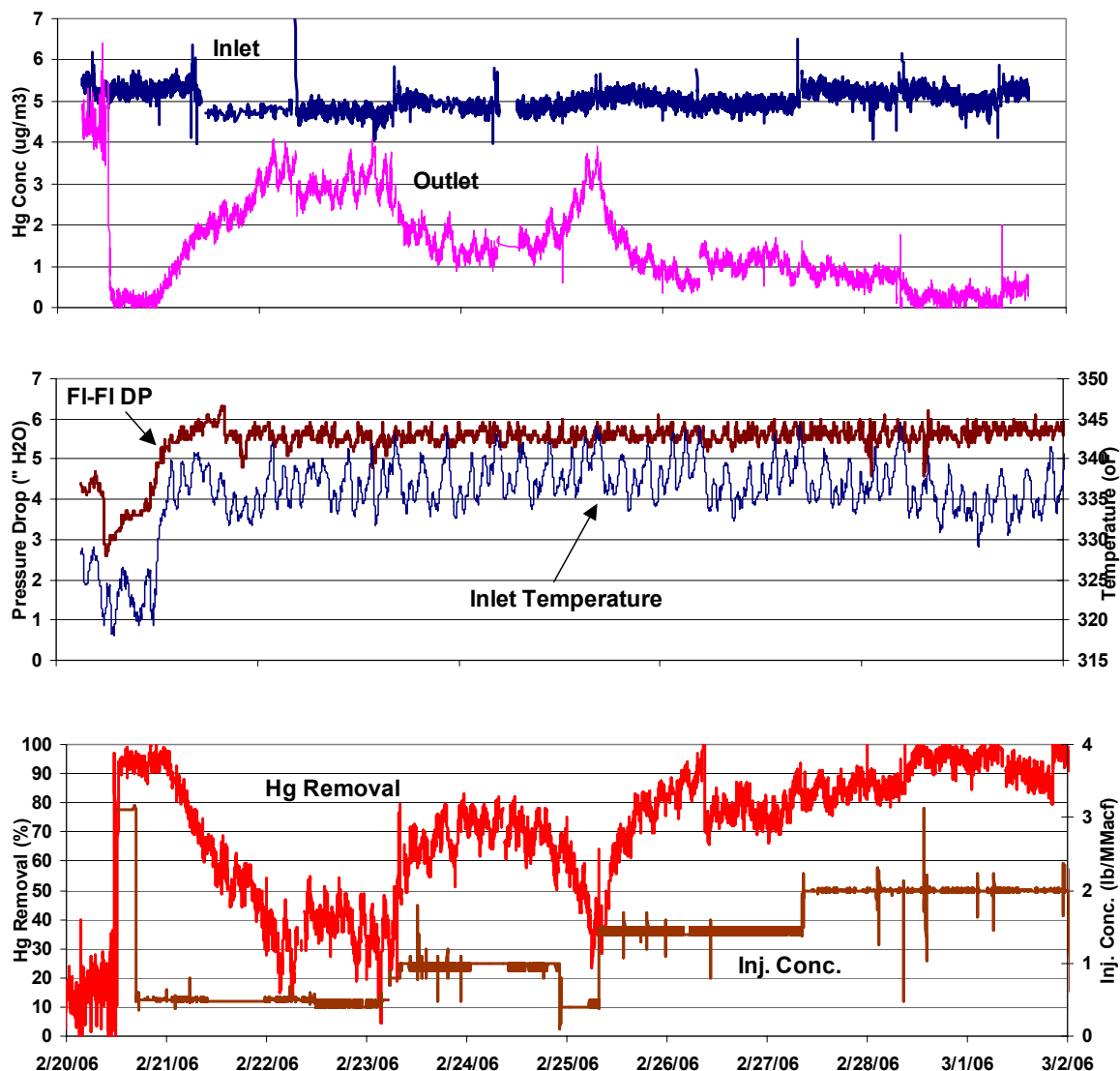


Figure 7. Inlet and outlet mercury concentrations, carbon injection concentration, baghouse pressure drop, inlet temperature and removal February 20 – March 1, 2006.

Because of the significant and unexpected, but consistent variation in outlet mercury with temperature, the criteria of operating for 24 hours at a removal efficiency (RE) $\pm 5\%$ was waived.

On February 23 the injection concentration was increased to 1.0 lb/MMacf. Average RE was nominally 73%, but varied between 69 and 80%. When injection concentration was increased, a slight increase in fl-fl pressure drop was also seen.

On February 25 the injection concentration was increased to 1.5 lb/MMacf. Average RE was nominally 80%, but varied between 70 and 85%.

On February 27 the injection concentration was increased to 2.0 lb/MMacf. The average RE was nominally 90%, but varied between 80 and 95%.

The relationship between mercury removal and inlet temperature during testing at 1 lb/MMacf can be seen in Figure 8. The cycling pattern of inlet temperature and the similar pattern for outlet mercury concentration are illustrated in Figure 9.

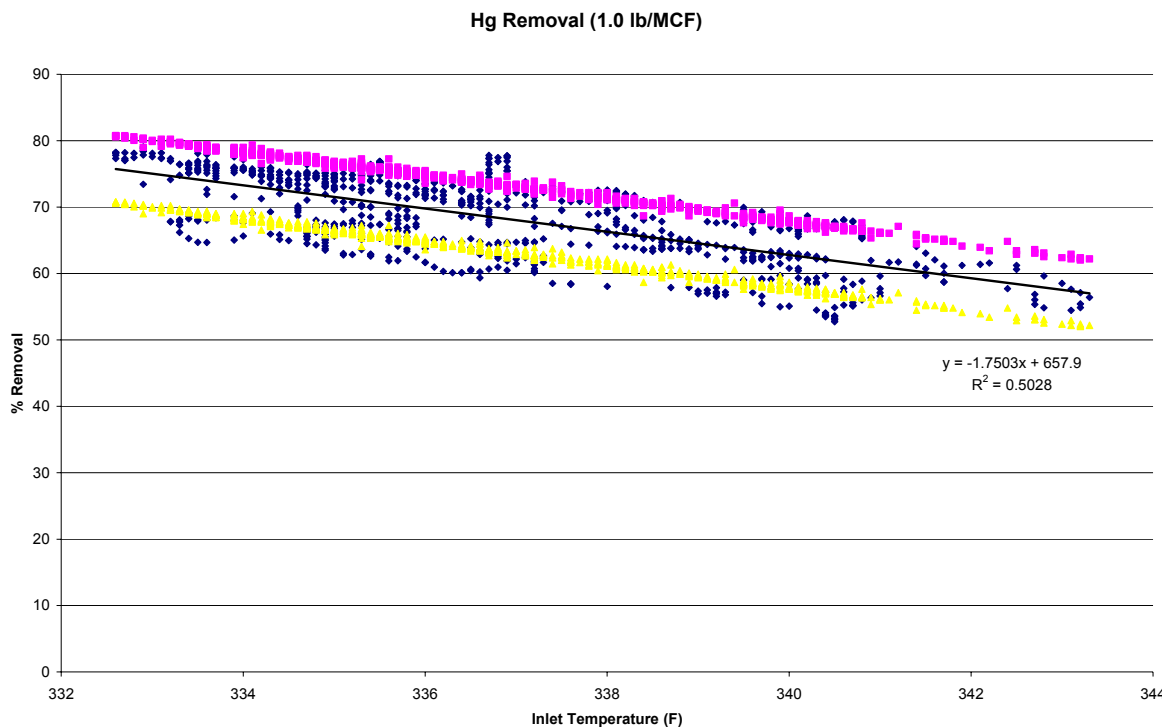


Figure 8. Linear regression showing relationship between inlet temperature and mercury removal efficiency and $\pm 5\%$ band.

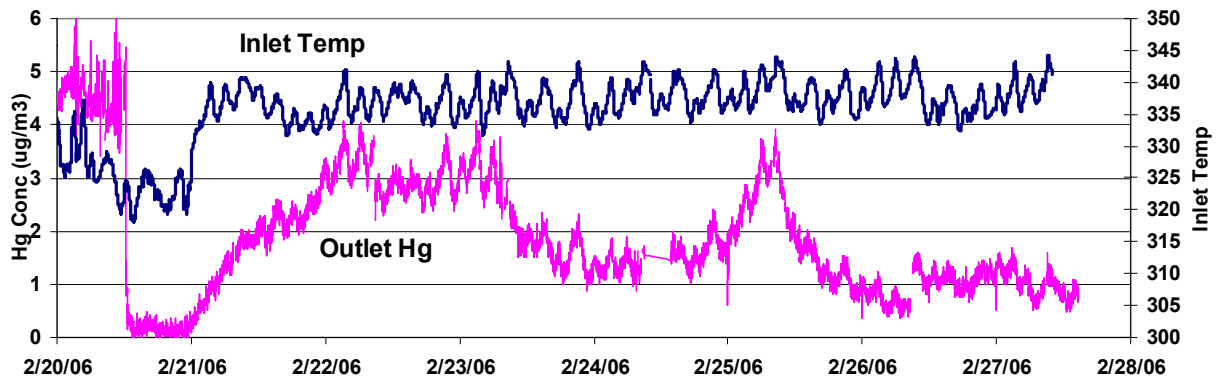


Figure 9. Inlet Temperature and Outlet Mercury Concentration.

The obvious and instantaneous response in outlet mercury concentration to changes in inlet temperature is surprising, especially in the magnitude of the change: a 10°F increase in temperature appears to result in up to a 1 µg/m³ increase in mercury. We do know that this temperature range, 333 – 350°F, is where DARCO Hg begins to lose its ability to adsorb mercury so it is possible that we are just seeing the sensitivity in performance as temperature increases. Another factor is that as temperatures increase, mercury desorbs from the sorbent (activated carbon or ash) until a new equilibrium is reached. We believe we saw this during the shake down period when outlet mercury was higher than inlet mercury after carbon injection was stopped.

The overall removal efficiencies from the parametric tests can be seen in Table 12.

Table 12. Results from Parametric Tests with DARCO Hg

Inj. Conc. (lbs/MMacf)	Feedrate (lbs/h)	Results (% removal)	± % Range	Comments
0.5	30	~38		
3.0	180	~96		
0.5	30	~38	20 - 50	RE varies with temp
1.0	60	~73	69 - 80	RE varies with temp
1.5	90	~80	70 - 85	RE varies with temp
2.0	120	~90	80 - 95	RE varies with temp

Sample Collection and Analysis

During parametric testing, coal and ash samples were collected from the coal feeders on Units 7-9, the hot-side ESP ash hoppers and the TOXECON™ baghouse hoppers. Table 13 lists the sampling schedule. These samples were shipped to ADA-ES and stored. They will be analyzed as needed to determine:

1. Variation in coal mercury concentration between the three units and between the four feeders on each unit;
2. Mercury concentration in the ash collected in the hot-side ESPs; and
3. Mercury concentration in and variation between hoppers of the ash collected by the TOXECON™ baghouse.

Table 13. Coal and Ash Sampling Schedule – Parametric

Sample	Location	Dates	# Samples
Coal	Feeder A1 on Units 7-9	M, W, F (3 samples per day)	9 total/week
ESP Ash	Hopper A on Units 7-9	M, W, F (3 samples per day)	9 total/week
Baghouse Ash	Hoppers 1-10	M, W, F (10 samples per day)	30 total/week

Overheating of PAC/Ash in Baghouse Hoppers

Hot, burning embers were found in the compartment #5 hopper of the TOXECON™ baghouse on March 1. The compartment #5 hopper was plugging during ash removal on February 28 and an inspection was performed to determine the cause. This compartment was isolated and the baghouse remained in service. All of the compartments were then checked and embers were found in all of the hoppers. The compartments were isolated on March 2 and the baghouse put into bypass mode. This section documents the events that occurred and testing that has been conducted to date to determine the cause of this unexpected event.

The following is a detailed timeline of the events:

Timeline

- Parametric testing: PAC injection rate increased to 2.0 lb/MMacf on Sunday, 2/26.
- On Tuesday, 2/28, a report indicated that plugging of the hopper throat was occurring on compartment #5. On Monday, 2/27 some embers were found during ash sampling. It was not clear what was causing the plugging or embers.
- On Wednesday, 3/1, hot embers were again found in the hopper of compartment #5. This compartment was isolated and the baghouse remained in service. An investigation began to determine the cause of the problem. Reports from all other TOXECON™ projects were that this had never happened before.
- On Thursday, 3/2, hot embers were found in all the baghouse hoppers. PAC injection was stopped at approximately 2:00 am when this was noticed. The baghouse was put in bypass mode and the compartments isolated. The hoppers were first flooded with water, allowed to cool, and then the ash vacuumed out.
- On Friday, 3/3, all of the hoppers had been cleaned and the ash handling system cleaned. The baghouse was returned from bypass mode to in service mode. All compartments were in service. Pressure drops and opacity levels looked normal. However, we had

previously been cautioned that bag problems would not be expected to be evident by these readings.

- There was some indication that at least one ash hopper was not completely emptying. Rat-holing was noticed when the inspection door was opened.
- Samples of the activated carbon from the PAC silo were taken for testing and analysis. Samples were sent to Norit and ADA-ES. Samples from the ash hoppers were also taken to be analyzed as needed.
- The only known source of external heat appears to be the hopper heaters, which were normally on and maintain hopper wall temperatures between 230°F and 275°F as measured by a device mounted external to the hopper.
- Some flanges on the hoppers were found to be loose. Any leakage in this area would cause air to enter the hoppers.
- No overheating problems were found in either the PAC silo or the ash silo.
- On 3/7, compartment #4 was opened and inspected. Ash was seen in areas on the tube sheet. Bags were pulled from these areas and many showed melted bag material, especially near the bottom of the bag. The inspection was complete on 3/10. There were 117 failed bags in Compartment 4A and none in Compartment 4B. All compartment inspection sheets are in Appendix C.
- On 3/13 Compartment #3 was opened and inspected. There were 83 failed bags in 3A and none in 3B.
- On 3/16 Compartments #5 and #7 were opened and inspected. There were no failed bags seen. Three bags were taken for testing from each compartment.
- On 3/17 Compartments #1 and #6 were opened and inspected. There were no failed bags seen. Three bags were taken for testing from each compartment.
- On 3/20 Compartments #9 and #10 were opened and inspected. There were no failed bags seen. Three bags were taken for testing.
- On 3/21 Compartments #2 and #8 were opened and inspected. There were no failed bags seen. Three bags were taken for testing from each compartment. One P84 test bag and one BHA membrane test bag was taken from compartment #8.
- On 3/24 using scaffolding placed inside the hoppers of Compartments #3, #4, and #9, a detailed inspection of the bottom of the bags and interior of the hoppers was performed. All of the bags were checked by physically examining the bottom portion of each bag to determine if they were stiff or had lost flexibility due to overheating. No problems were found. In addition, samples of deposits on the hopper walls were taken for lab analysis.

PAC and Ash Analysis

The PAC sample from the silo sent to ADA-ES was split and a portion sent to a local analytical laboratory for a thermo gravimetric analysis. This analysis determines the temperature of combustion in air. The PAC began losing significant weight at about 400°C (750°F). The PAC had a temperature of ignition at 456°C (852°F), which is consistent with the MSDS for this type of carbon. The TGA report is in Appendix D.

PAC/ash samples from Compartment #4 baghouse hoppers on 2/24 and 2/27 were also sent for TGA tests. The sample from 2/24 lost approximately 5% of the total weight by 314°C, indicating some relatively volatile material was coming off at these lower temperatures. The

pure PAC from the silo did not show this trend. The sample from 2/27 did not show that initial weight loss as might be expected, but when this sample was taken, it was the first time that embers were seen in the hopper, so the sample had already been heated to a high temperature, which would have driven off any volatiles.

We Energies also performed a TGA on the PAC using nitrogen gas. They found that the pure PAC from the silo lost significant weight at about 475°C, which is similar to the test performed by ADA-ES (Figure 10). The TGA tests were then repeated using air as a purge gas. At 500°F and 550°F, there was no weight loss and no visual sign of embers. Initial sample weight loss began at 720°F and the profile was similar to the test run by ADA-ES.

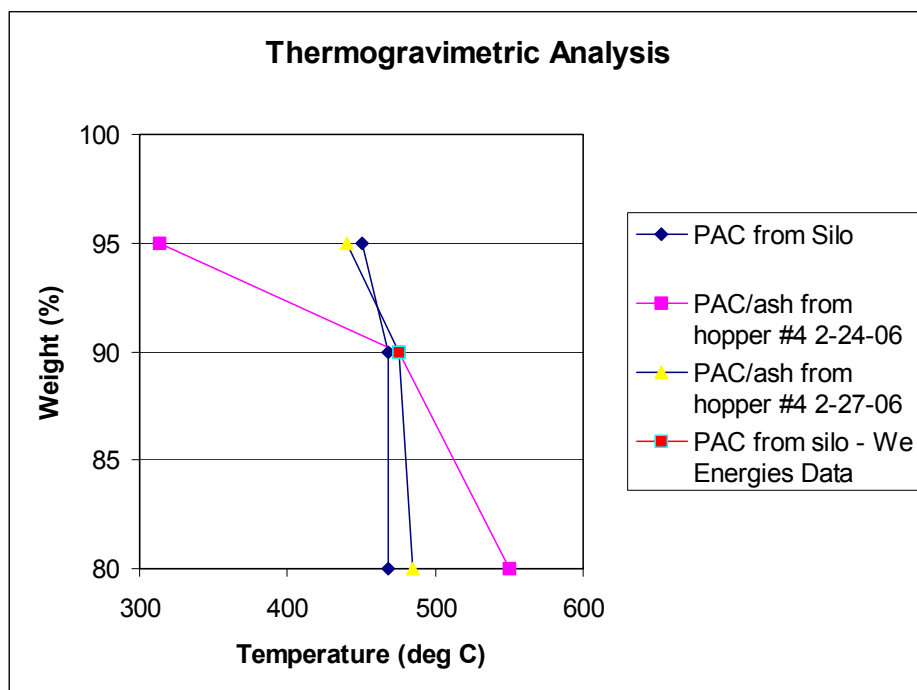


Figure 10. Combustion Temperature Comparison of PAC and PAC/ash

We Energies also performed a series of tests using an open cup flash point determination apparatus. This apparatus consists of a heavy cup on a hot plate with an open flame above to ignite any volatiles released as the material in the cup is heated. There was no release of combustible volatile compounds at temperatures up to 500°F. However, when removing the sample material from the cup after allowing several hours for cooling, they noted glowing embers in the bottom of the cup along with a significant amount of gray/ash material indicating that combustion had occurred at the bottom of the cup. The material on the surface of the cup had shown no evidence of combustion occurring. This shows that PAC can ignite on contact with a hot surface under low oxygen conditions and maintain combustion.

We Energies performed another series of tests in the flash point apparatus. PAC/Ash mixtures were placed in the cup, and thermocouples were positioned at the bottom of the cup

and approximately ¼” from the bottom. There seemed to be no significant difference in the temperature at which smoldering was first observed, indicating that the presence of ash does not change the temperature of ignition of PAC. Table 14 shows the results of these tests.

Table 14. Temperature Comparisons on PAC and PAC/ash Mixtures

Sample	Bottom Temperature (°F)	Bulk Sample Temperature (°F)	Observations
PAC	650	395	No change in appearance
	700	490	No change in appearance
	750	560	No change in appearance
	784	580	Smoldering occurred
PAC/ash 4:1	650	375	No change in appearance
	700	445	No change in appearance
	750	520	No change in appearance
	779	570	Smoldering occurred
PAC/ash 2:1	650	430	No change in appearance
	700	445	No change in appearance
	750	480	No change in appearance
	792	560	Smoldering occurred
PAC/ash 1:1	650	430	No change in appearance
	700	440	No change in appearance
	750	490	No change in appearance
	799	535	Smoldering occurred

ADA-ES performed two long-term tests on PAC and PAC/ash from the baghouse hoppers. On March 3, a 50 g sample of PAC from the silo was placed in an open crucible and then in an oven set at 320°F. The sample was stirred every few days to check for changes below the surface, but it showed no change in appearance or sparklers after 10 days in the oven. In addition, on March 3, a sample of PAC and a sample of the PAC/ash from the hoppers was placed on a piece of rusty carbon steel and placed in the oven to see if there was any interaction with the metal. There was no change in appearance after 10 days of heating at 320°F.

Column Reactor Tests

ADA-ES designed and built a column reactor for testing PAC and PAC/ash to measure any increase in temperature from heat of adsorption. The reactor was 2” diameter stainless steel construction with multiple ports for thermocouples. Figure 11 is a picture of the apparatus.

In this reactor, PAC or PAC/ash would be loaded into the column and gas introduced into the bottom of the column. Multiple thermocouples placed in the center of the bed monitored temperature. Heat tape provided the heat source for the column. The gas entering the column could be heated as needed also.

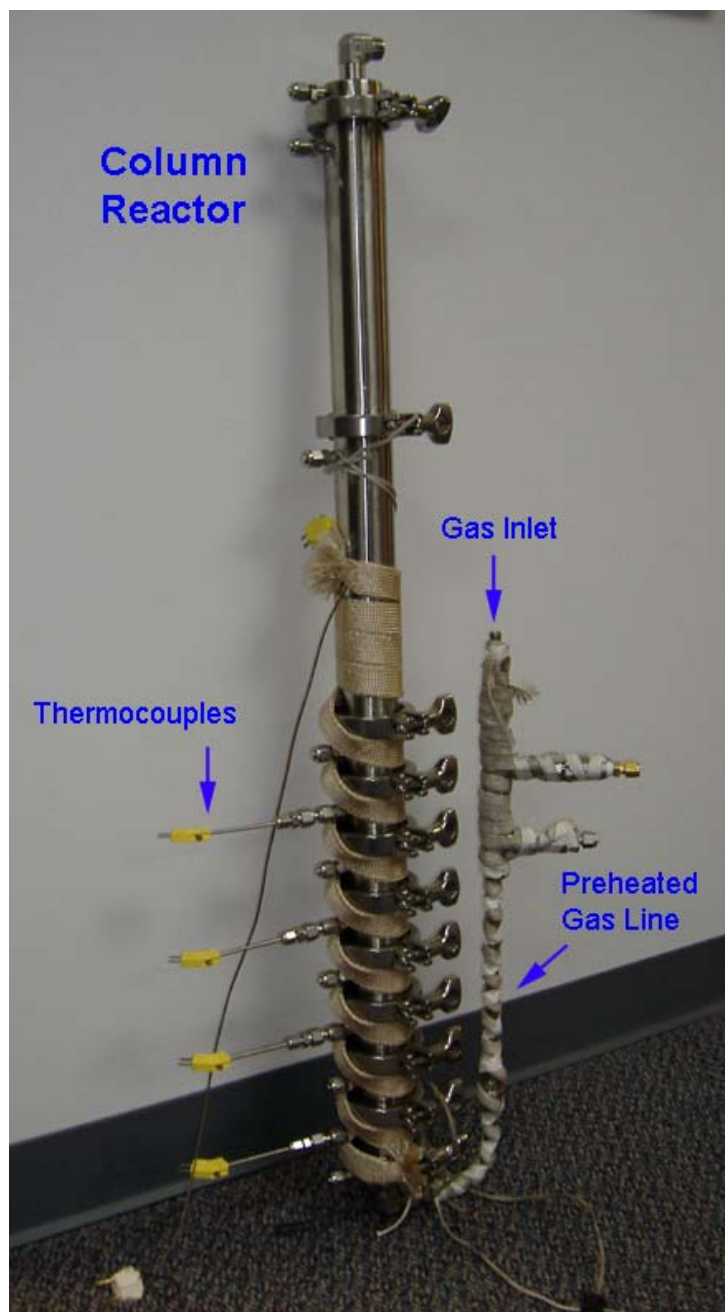


Figure 11. Column Reactor

Details of the tests performed using this apparatus in March are listed in Table 15.

Table 15. Column Reactor Tests

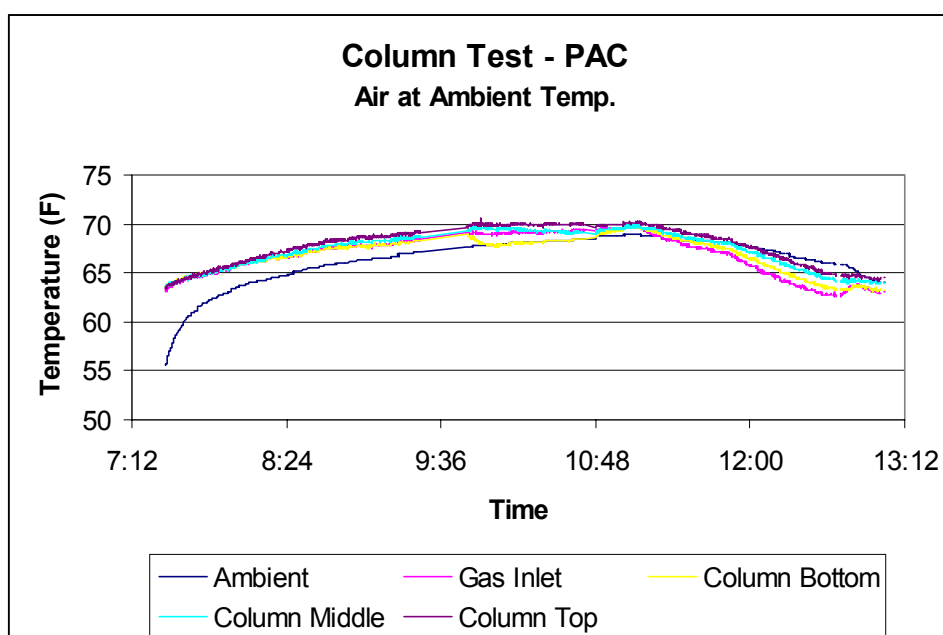
Test #	Column Material	Inlet Gas/Bed Temperature (F)	Gas Composition	Gas Flow Rate (cc/min)	Gas Contact Time (hr)	Time with No Gas Flow (hr)
1	PAC	70	Air	500	4	4
2	PAC	70	Simulated Flue Gas	500	4	4
3	PAC	340	Simulated Flue Gas	500	4	4

The simulated flue gas used in the column tests contained similar major gases at close to the amounts found in the flue gas at Presque Isle. Table 16 lists the gases used.

Table 16. Simulated Flue Gas Composition

Flue Gas Component	Amount
CO ₂	13.5%
O ₂	5.5%
Moisture	11%
SO ₂	225 ppm

The first test at ambient conditions is shown in Figure 12 and only air showed a minimal temperature rise that corresponded to the ambient temperature increase. This shows that air contact and/or adsorption has no appreciable effect on PAC temperature.

**Figure 12. Column Test - PAC with Air at Ambient Temperature.**

The second test using air at a temperature similar to the flue gas temperature going into the baghouse showed similar results (Figure 13).

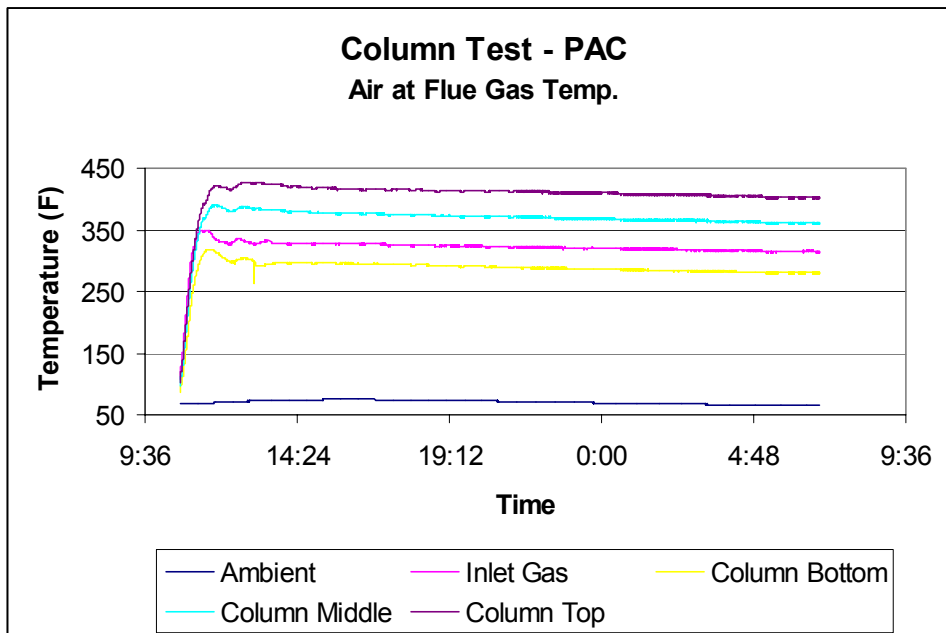


Figure 13. Column Test - PAC with Air at Flue Gas Temperature.

Figure 14 shows the results using the simulated flue gas. When the gas flow was terminated, the gas inlet value went down and the temperature in the middle thermocouple went up. Since the other two column thermocouples did not respond, this may have been an anomaly. In general, the PAC did not exhibit any heat of adsorption using the simulated flue gas.

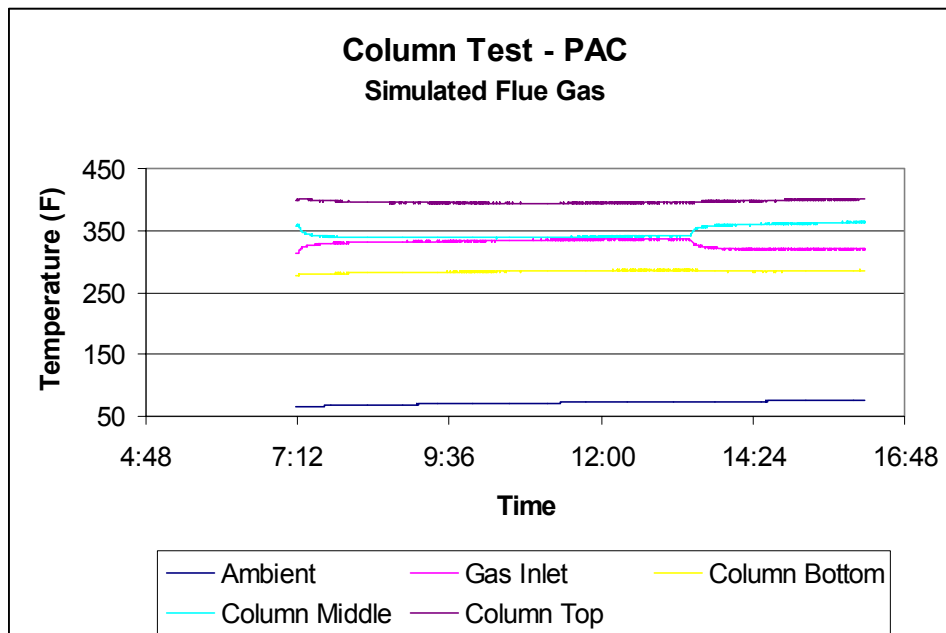


Figure 14. Column Test - PAC with Simulated Flue Gas

Flue Gas Temperature Comparison

A comparison was made of the inlet and outlet baghouse temperatures to determine if there was any indication of overheating. Figure 15 shows inlet and outlet temperatures along with flange-to-flange pressure drop across the baghouse. There did not seem to be any indication of problems with heating or pressure before or during the overheating event.

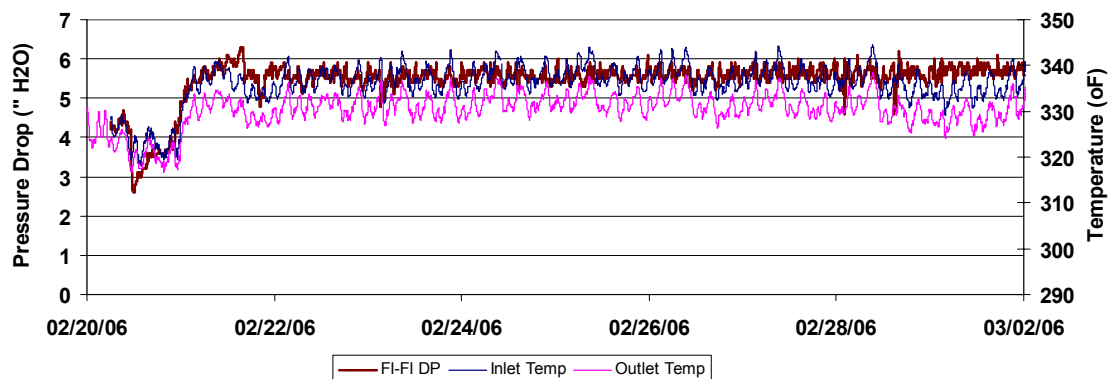


Figure 15. Baghouse Temperature Comparison

TOXECON™ Comparison

Overheating of the PAC/ash mixture has not been seen at any plant using PAC injection or the TOXECON™ process. A year-long TOXECON™ test was performed at Plant Gaston with no incident of overheating in the hoppers. Table 17 lists various parameters from each plant.

Table 17. Comparison of Presque Isle and Plant Gaston

	Gaston	PIPP
Manufacturer	Hamon Research Cottrell	Wheelabrator Air Pollution Control
Type	Low Pressure Pulse-jet	Medium Pressure Pulse-jet
Configuration	Hot-side ESP/COHPAC	Hot-side ESP/TOXECON
Coal	Low sulfur eastern bituminous	PRB
Design air-to-cloth (gross)	8.5	5.5
Cleaning	On-line	On-line
Max cleaning (p/b/h)	4.4 (1.75 Typ.)	
Bag length (feet)	23	26
Bag diameter (inches)	4.9 equivalent (oval bag)	5.0
Bag material (Nominal Wgt.)	18 ounce/yd ² PPS	18 ounce/yd ² PPS
Pulse pressure (psi)	12	60
Ash loading (gr/acf)	0.03 – 0.14	0.0048
Outlet emissions (lbs/MMacf)	0.0045	0.034
Ash LOI (%)	11 - 25	<0.5
PAC Type	Norit DARCO Hg	Norit DARCO Hg
PAC loading (lbs/MMacf)	0.5 – 2.0	0.5 – 2.0
PAC loading (gr/acf)	0.0016 – 0.0128	0.0032 – 0.0128
Time of operation with PAC	8 months	~ 5 weeks
Hopper heaters	None	Yes, Thermon resistance heaters (12.5 kW/hopper)
Hopper evacuation schedule	Every 2-3 hours per B. Corina at Gaston. (when requested, operators would shut off ash pulling system to build up ash for a sample)	Every 12 hours
Fluidizing System	Vibrators	Vibrators
Ash system	Wet, hydroveyor system	Dry, pneumatic
Overheating of hopper ash/PAC	No	Yes, all hoppers
No. Cage Sections	2	2

Baghouse Cage Inspections

During the inspections for damaged bags due to overheating, personnel noticed that several of the cages were separated at the connecting collar. A more detailed inspection of the cages in one compartment was initiated. This inspection showed that a majority of the cages had some kind of defect (installation or fabrication) that had to be fixed. A decision was made to inspect and repair, as needed, every cage in every compartment. This process was anticipated to take about three weeks and will be completed in the next reporting period.

During the inspection of Compartment #1 the crew noticed that the pulse pipe j-tubes on the exterior wall in section 1B had $\frac{1}{4}$ - $\frac{1}{2}$ " of precipitate near the openings. The precipitate was very hard, brittle, and smelled of sulfur (Figures 16 and 17). Samples were taken and bagged. The majority of the precipitate was at the horizontal run where the tube connected with the pulse pipe. There were also small piles of this precipitate below the connection of the pulse pipes and the j-tubes where this had leaked out from the tube. There was no precipitate buildup in the pulse pipes themselves although there were signs that precipitate-laden liquid had run down some of the cages in the first row near the wall. The j-tubes in section 1A had no noticeable precipitate (Figure 18). The precipitate was cleaned out before the pulse pipes were reinstalled. It is anticipated that this problem will be fixed by adding insulation around the j-tubes where they are external to the baghouse structure. This should be completed during the next reporting period.

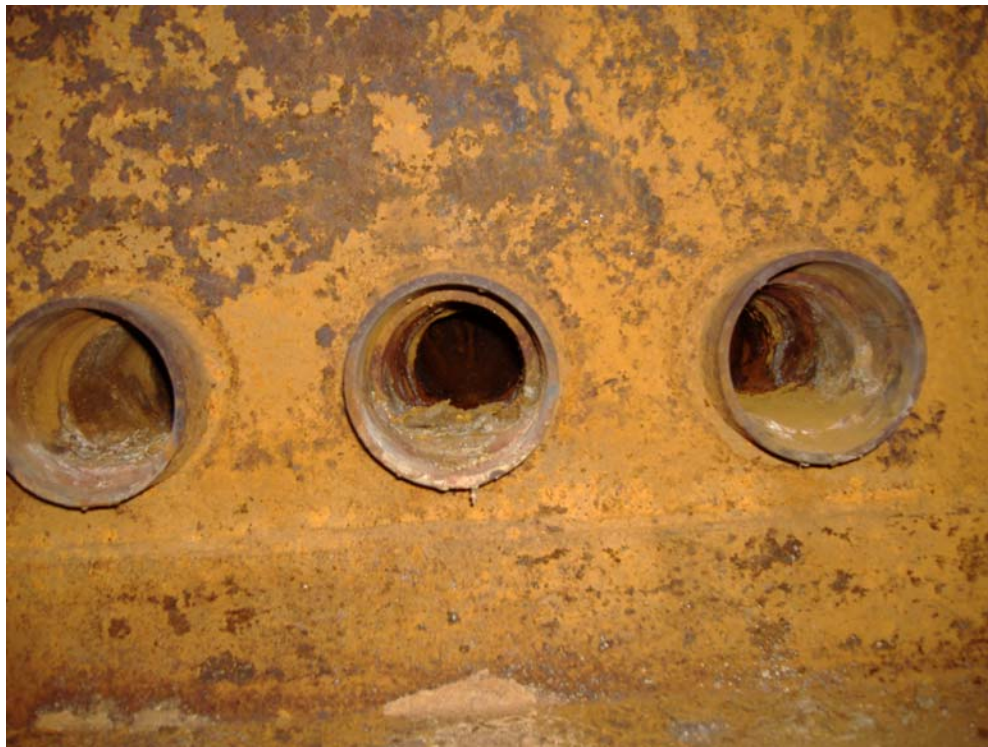


Figure 16. Precipitate in Compartment #1



Figure 17. Close-up of Precipitate from Compartment #1



Figure 18. Interior Wall j-tubes in Compartment #1

Hopper Test

On March 30, We Energies performed a test in Compartment #4 hopper. Four thermocouples were welded to each interior hopper wall. These were placed so that they would be 6" below the upper surface of PAC. One thermocouple was also placed between the hottest heater and the outside wall of the hopper. Four thermocouples were wired to metal rods, which were then placed in the PAC bed (Figures 19 and 20). The ends of the thermocouples were located 2.5' above the bottom of the rod.

A total of 360 lbs of PAC was then loaded into the hopper. This was approximately 4' of material. The hopper heaters were turned on at 12:46 pm. The temperature in the hopper reached approximately 395°F with the rate of increase becoming negligible (Figure 21), so the test was terminated at 3:52 pm. The plan was to start the heaters again when there is flue gas going into the hopper. The maximum temperature reached in the PAC bed was 173°F (Figure 22). The hopper heater control was set to 275°F but the highest indication it gave was 210°F and the heater never cycled off during the test.



Figure 19. Thermocouples for PAC Bed



Figure 20. Thermocouples in PAC Bed

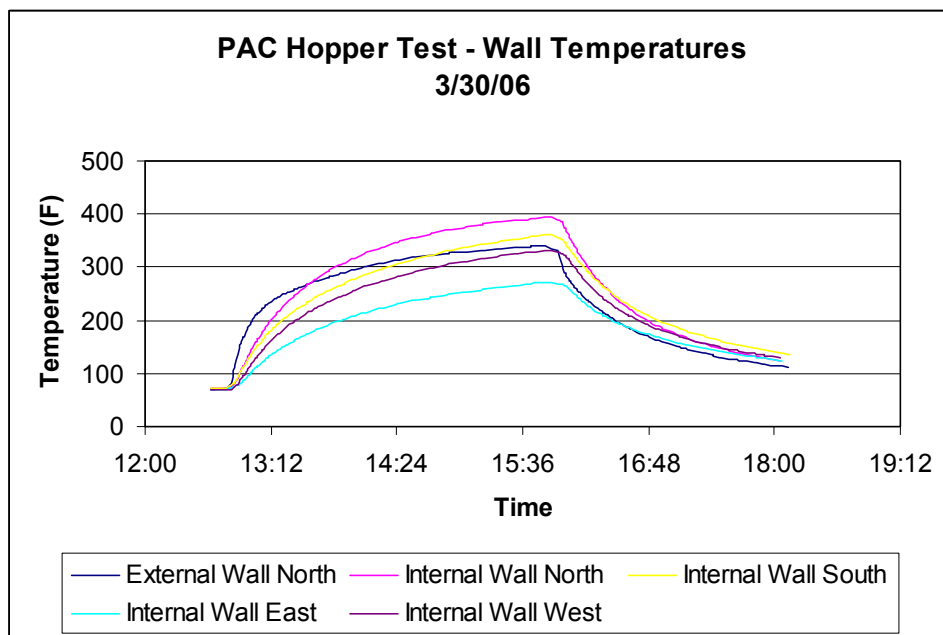


Figure 21. PAC Hopper Test - Inside Wall Temperatures

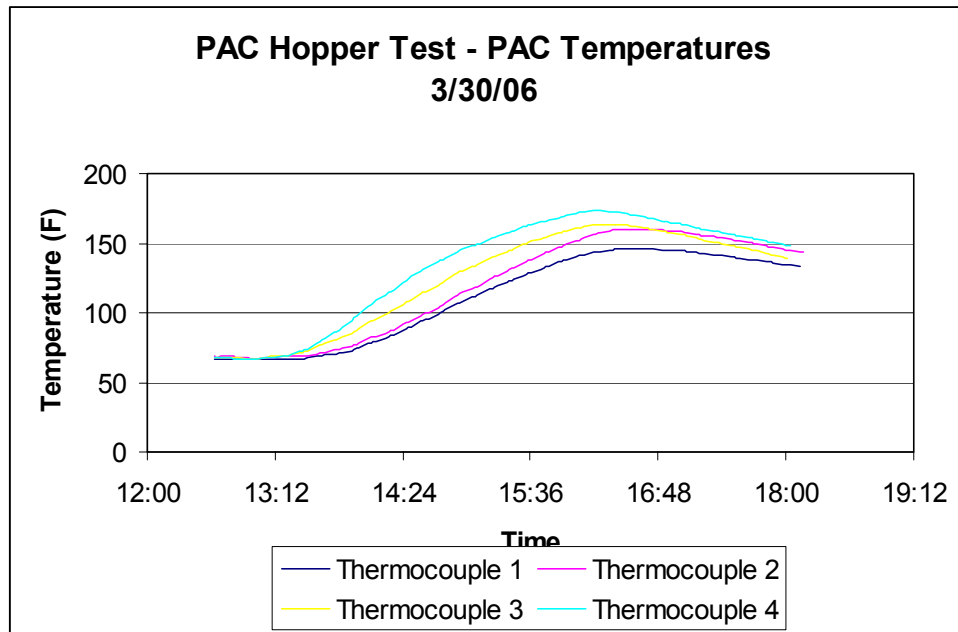


Figure 22. PAC Hopper Test - PAC Bed Temperatures

Mercury Quality Index Test

Background and Objective

None of the standard tests used for quality assurance testing of activated carbon are specific to mercury. While putting together the specification for the PAC contract, this deficiency was noted and an effort begun to develop a “Mercury Quality Index” or MQI that can be used by industry.

The overall objective of this effort is to develop a technique to measure the vapor phase mercury sorption capability of activated carbon at conditions that more closely represent the flue gas from utility boilers. To accomplish this, the following objectives must be met:

- Design and test an apparatus consisting of:
 - A sorbent test chamber
 - A mercury analyzer
 - A means of producing a gas stream containing mercury and other important flue gas components.
- Develop a procedure to test various sorbents

Work to Date

Work began on the MQI apparatus in February 2006. The first step was to develop a design concept. It was decided that the important flue gas components that effect mercury sorption by activated carbon were mercury, sulfur dioxide (SO₂) and hydrochloric acid (HCl). The

other parameter that is known to affect mercury sorption is temperature. Using these guidelines, an apparatus was constructed as shown in Figure 23. The main components are:

- Mercury vapor source
- Source for SO₂ and HCl gas with the option to selection high and low SO₂ values
- Temperature controlled enclosure for the test beds
- Mercury CEM
- Converter to ensure that all mercury from the test beds is converted to elemental mercury

Construction was completed in early March and Norit visited the test site on March 8-9 for a demonstration. Initial trials indicated that modifications were needed to apparatus and further shakedown tests were required to ensure that all components were working properly.

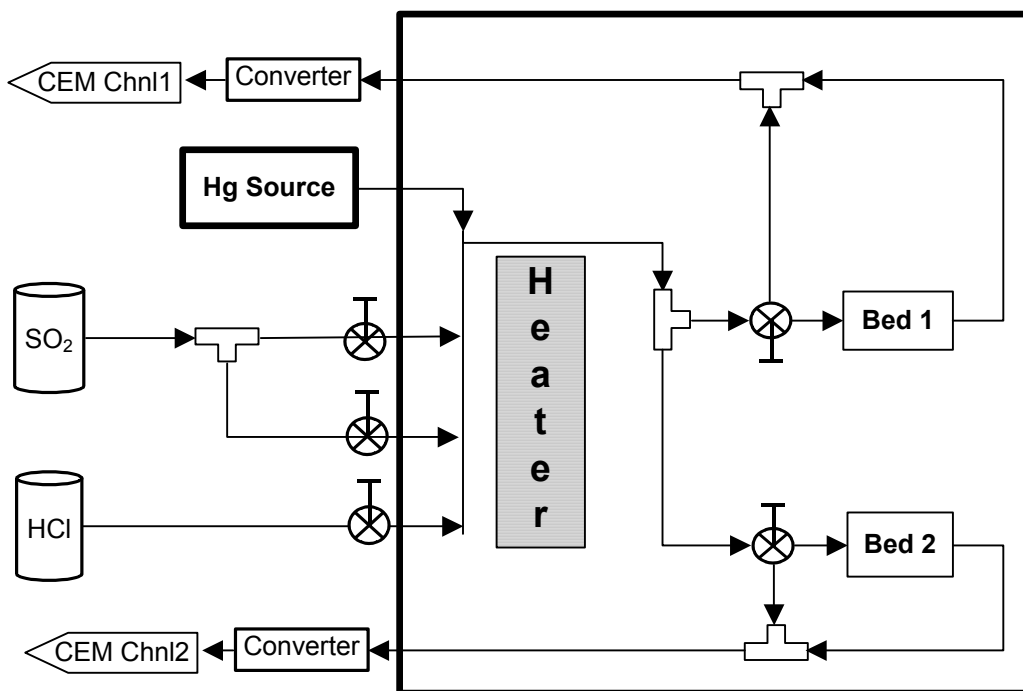


Figure 23. Mercury Quality Index Test Apparatus.

Future Work

Initial testing indicated that the original flow control devices were oversized so smaller ones have been ordered. Further tests will be conducted in April.

Task 16 – Operate, Test, Data Analysis and Optimize TOXECON™ for NO_x and SO₂ Control

No work was done on this task during this period.

Task 17 – Carbon – Ash Management System

No work was done on this task during this period.

Task 18 – Revise Design Specifications, Prepare O&M Manuals

Work was initiated on preparation of C&B as-built drawings for the project during 1Q06.

Task 19 – Reporting, Management, Subcontracts, Technology Transfer

Reports as required in the Financial Assistance Reporting Requirements Checklist and the Statement of Project Objectives are prepared and submitted under this task. Subcontract management, communications, outreach, and technology transfer functions are also performed under this task.

Activity during the Quarter

- Quarterly Technical Progress Report delivered.
- Quarterly Financial Status Report delivered.
- Quarterly Federal Assistance Program/Project Status Report delivered.
- A poster was updated for the celebration at Presque Isle on April 21, 2006.
- Abstracts were submitted to the Western Coals Conference, POWER-GEN Conference, and MEGA Symposium.
- A presentation was made at the EUEC conference in Tucson in January 2006.
- Technical papers and presentations for future meetings include the MEGA Symposium (August 2006), POWER-GEN (November 2006), and Western Fuels Symposium (October 2006), and 8th International Mercury as a Global Pollutant Conference (August 2006).

CONCLUSION

This is the eighth Technical Progress Report under Cooperative Agreement No. DE-FC26-04NT41766. All major construction efforts were completed during 4Q05, and only punch list items remained during the current quarter. Work performed on punch list items included: access platform work, insulation, and final cleanup. Demobilization of the majority of the contractors was complete this quarter.

On December 17, the baghouse was put into service with flue gas from Unit 7. Unit 9 was added on January 5 and Unit 8 on January 27, 2006.

Start-up and checkout of the PAC silo was completed this quarter. Calibration of the feeders showed a discrepancy in feed rate from what was initially calculated. The DCS program was adjusted accordingly to provide accurate feed rate control into the ducts.

Baseline tests were performed the week of February 13, 2006. The Ontario Hydro measurements for mercury were in good agreement with the Thermo CEMs. The particulate removal rate across the baghouse was measured at 99.6%, with an emission rate of 0.00011 lb/MMBtu. As expected, the halogen levels were very low with an average of 3.81 ppm HCl in the flue gas. Ash and coal samples taken during baseline showed that the ESP ash from units 7-9 was around 1% with a mercury level below the detection limit of 10 ng/g. Coal mercury ranged between 35-89 ng/g and chlorine levels between 43-116 µg/g.

Parametric tests began the week of February 20, 2006. Four injection rates ranging from 0.5-2.0 lb/MMacf were used for approximately 48 hours each. The mercury removal for these tests was from approximately 38-90%.

On March 1, burning embers were found in the TOXECON™ hoppers. The PAC injection was discontinued and the flue gas diverted from the baghouse to the stack. The hot PAC/ash in each hopper was cooled and removed. Bags were inspected in each compartment for damage. Two compartments had burned bags that had to be replaced; 117 bags in one compartment and 83 in another. None of the other compartments showed damage. Thermogravimetric tests performed on the PAC and PAC/ash mixture showed a heat of combustion of around 850°F although smoldering of the PAC occurred at around 780°F. Column tests performed on PAC using a hot simulated flue gas did not show a heat of adsorption at typical flue gas temperatures. The effect of the hopper heaters was tested in one of the cooled hoppers using 360 lbs of fresh PAC. The temperature of the hopper walls did not exceed 395°F after almost 4 hours. This test will be repeated when the baghouse is back in service.

Work continued in the evaluation of components for a mercury continuous emissions monitor system. This c-series CEM was replaced with the upgraded i-series CEM in 4Q05 and an additional i-series CEM was installed at the outlet of the baghouse. The project team is actively involved in a number of reporting and technology transfer activities.

A Mercury Quality Index apparatus has been designed and fabricated. The objective is to develop a technique to measure the vapor phase mercury sorption capability of activated carbon at conditions representing flue gas in utility boilers. Testing on the apparatus and development of the test procedure will continue in the next quarter.

Appendix A

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ISO 9001 Accredited
Quality System

PARTICULATE AND GASEOUS EMISSIONS STUDY

Prepared For
ADA-ES, Inc.

Performed At
**We Energies
Presque Isle Power Plant
Baghouse Inlet and Outlet
Marquette, Michigan**

Test Dates
February 14 through 16, 2006

Report No.
GE Energy Management Services, Inc. Report M22E1184A

Report Submittal Date
April 18, 2006



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GE Energy Management Services, Inc.
888 Industrial Drive
Elmhurst, IL 60126
USA

T 630-530-6600
F 630-530-6630



GE Energy

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CERTIFICATION SHEET

Having reviewed the test program described in this report, I hereby certify the data, information, and results in this report to be accurate and true according to the methods and procedures used.

Data collected under the supervision of others is included in this report and is presumed to have been gathered in accordance with recognized standards.

GE ENERGY MANAGEMENT SERVICES, INC.

Frank H. Jarke
Quality Assurance Manager

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GE Energy

PARTICULATE AND GASEOUS EMISSIONS STUDY

Performed For

ADA-ES, Inc.

At The

We Energies

Presque Isle Power Plant

Baghouse Inlet and Outlet

February 14 through 16, 2006

1.0 INTRODUCTION

GE Energy Management Services, Inc., ("GE Energy") performed a particulate and gaseous emission test program on the Baghouse Inlet and Outlet at the Presque Isle Power Plant of We Energies in Marquette, Michigan on February 14 through 16, 2006. The tests were authorized by We Energies and performed for ADA-ES, Inc.

The purpose of this test program was to determine hydrogen chloride (HCl), bromine (Br₂), hydrogen bromide (HBr), chlorine (Cl₂), particulate, mercury and speciated mercury emission rates during normal operating conditions.

1.1 Project Contact Information

Location	Address	Contact
Test Coordinator	ADA-ES, Inc. 8100 South Park Way Unit B Littleton, Colorado, 80120	Ms. Robin Stewart Senior Project Engineer 303-339-8863 (phone) 303-339-0330 (fax) robins@adaes.com (email)
Testing Company Representative	GE Energy Management Services, Inc. 888 Industrial Drive Elmhurst, Illinois 60126	Mr. Douglas M. Ryan Project Manager 630-530-6640 (phone) 630-530-6630 (fax) douglas.ryan@ge.com

The tests were conducted by Messrs. A. Sakellariou, C. Miller, T. Cassin, M. Hamling and D. Ryan of GE Energy.

2.0 SUMMARY OF RESULTS

The following tables summarizes test results at each of the test locations:

Parameter	Reference Method	Units	Common Inlet	Common Outlet
Particle Bound Mercury	Ontario Hydro	lbs/hr	0.00005	0.00002
		lb/Tbtu	0.01589	0.00629
Oxidized Mercury	Ontario Hydro	lbs/hr	0.00139	0.01173
		lb/Tbtu	0.43604	3.85586
Elemental Mercury	Ontario Hydro	lbs/hr	0.01547	0.00160
		lb/Tbtu	4.72178	0.51653
Total Mercury	Ontario Hydro	lbs/hr	0.01692	0.01336
		lb/Tbtu	5.29333	4.38950
HCl	Method 26A	lbs/hr	---	14.9909
		lb/mmBtu	---	0.0049
HBr	Method 26A	lbs/hr	---	0.4604
		lb/mmBtu	---	0.0001
Br ₂	Method 26A	lbs/hr	---	0.0000
		lb/mmBtu	---	0.0000
Cl ₂	Method 26A	lbs/hr	---	0.0000
		lb/mmBtu	---	0.0000
Filterable Particulate	Method 5	lbs/hr	110.166	1.701
		lb/mmBtu	0.0347	0.0006

Parameter	Reference Method	Units	Unit 7 Inlet	Unit 8 Inlet	Unit 9 Inlet	Baghouse Outlet
Mercury (Hg)	Method 324	ppm	0.00010	0.00008	0.00323	0.00054
		ug/l	0.00080	0.00212	0.02700	0.00455

Complete test results for all test locations and parameters are appended in Section 6.0.

3.0 DISCUSSION OF RESULTS

Source operation appeared normal during the entire test program. Problems were encountered with the M324 sampling trains. At each of the four test locations, it was discovered that significant variation existed from trap to trap. The thin-walled Teflon sleeves used to connect the two glass trap sections and glass liner all fit with varying amounts of resistance. Some traps were very difficult to separate and others separated unintentionally during assembly, and in one case sampling. Once this variation was discovered, every effort was made to check the connections and switch sleeves as needed. However, based on the sample analysis results, it appears that significant in-leakage occurred on many of the tests.

4.0 TEST PROCEDURES

All testing, sampling, analytical, and calibration procedures used for this test program were performed as described in the Title 40, Code of Federal Regulations, Part 60 (40CFR60), Appendix A, Methods 1, 2, 3, 5, 26A and 40CFR63 Method 324 and the Ontario Hydro Method. Where applicable, the Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, Stationary Source Specific Methods, United States Environmental Protection Agency (USEPA) 600/R-94/038c, September 1994 was used to supplement procedures.

4.1 Volumetric Flowrate Determination

In order to determine the emission rate on a lbs/hr basis, the gas velocities and volumetric flowrates were determined using Method 2, 40CFR60.

Velocity pressures were determined by traversing the test locations with S-type pitot tubes. Temperatures were measured using K-type thermocouples with calibrated digital temperature indicators. The molecular weight and moisture content of the gases were determined to permit the calculation of the volumetric flowrate. Sampling points utilized were determined using Method 1, 40CFR60.

4.2 Oxygen (O₂)/Carbon Dioxide (CO₂) Determination

Oxygen (O₂) and carbon dioxide (CO₂) gas contents were determined in accordance with Method 3, 40CFR60. This method collected samples in a grab manner and analyzed the samples using a Hays Orsat gas analyzer. Several gas extractions were performed during each test run to ensure a stable reading. Mandatory leak checks were performed prior to and following each use. Chemicals are changed frequently and inspected for reactivity prior to each use.

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4.3 Particulate Determination

A total of 24 test points were sampled using six (6) ports at the Baghouse Common Inlet and Outlet test locations.

The particulate sample trains were manufactured by Nutech Corporation of Durham, North Carolina and meet all specifications required by Method 5, 40CFR60. Teflon-lined probes were used. Drawings depicting the sampling ports, test point locations, and sample trains are appended to this report. Velocity pressures were determined simultaneously during sampling with a calibrated S-type pitot tube and inclined manometer. All temperatures were measured using K-type thermocouples with calibrated digital temperature indicators.

The filter media were Whatman 934-AH glass microfibre filters exhibiting a $\geq 99.97\%$ efficiency on 0.3 micron DOP smoke particles in accordance with ASTM Standard Method D-2986-71. All sample contact surfaces of the trains were washed with HPLC reagent-grade acetone. These washes were placed in sealed and marked containers for analysis.

4.4 Speciated Mercury Determination

A total of 24 test points were sampled using six (6) ports at the Baghouse Common Inlet and Outlet test locations.

The speciated mercury sample trains were manufactured by Nutech Corporation of Durham, North Carolina and meet all specifications required by The Ontario Hydro Method. Teflon-lined probe were used. Drawings depicting the sampling ports, test point locations, and sample trains are appended to this report. Velocity pressures were determined simultaneously during sampling with a calibrated S-type pitot tube and inclined manometer. All temperatures were measured using K-type thermocouples with calibrated digital temperature indicators.

The filter media were quartz filters exhibiting a $\geq 99.97\%$ efficiency on 0.3 micron DOP smoke particles in accordance with ASTM Standard Method D-2986-71. All sample contact surfaces of the train were washed with 0.1 N Nitric Acid. These washes were placed in sealed and marked containers for analysis. All sample recovery of impinger solutions was performed on site.

4.5 Hydrogen Halides (HCl, HBr, HF) and Halogens (Cl₂, Br₂) Determination

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Hydrogen chloride (HCl), hydrogen fluoride (HF), hydrogen bromide (HBr), bromine (Br₂) and chlorine (Cl₂) concentrations were determined using Method 26A, 40CFR60. An integrated twenty-four-point sample was extracted from the common outlet gas stream and passed through 0.1 N sulfuric acid (H₂SO₄) and 0.1 N sodium hydroxide (NaOH). The samples were then analyzed by ion chromatography. The sample train consisted of a heated glass probe liner, a heated filter, and six impingers. The first impinger was short stemmed and empty to knock out heavy moisture, the second and third impingers contained the dilute sulfuric acid, the fourth and fifth impingers contained a 0.1 N sodium hydroxide (NaOH) scrubber solution to remove any remaining chlorine, and the sixth impinger contained silica gel to absorb any remaining moisture. The train was leak checked prior to and after each run. The sample was then extracted isokinetically. The samples were recovered by quantitatively transferring the contents of the first three impingers (the knock out and the two acidic absorbing solution impingers) and deionized water rinses to a glass sample jar. Impingers 4 and 5 (alkaline absorbing solution) and deionized water rinses were transferred to a separate glass sample jar. The samples were labeled, and the level marked for transfer to the laboratory. The samples were then analyzed by ion chromatography.

The test trains were weighed before and after each test for moisture determination.

The test crew performed sample recovery at the test site and initial analysis was performed on site. Samples were transported to an approved lab for final analysis. Copies of all sample analysis sheets are appended to this report.

4.6 Vapor Phase Mercury Determination - Sorbent Trap Method

Mercury emissions were determined in accordance with USEPA Draft Method 324. A single point was used for paired train sorbent sampling at baghouse inlets 7, 8 & 9 and the common baghouse outlet.

Sorbent traps included main and backup sections in series for collection of Hg. The sorbent trap was supported on a probe and inserted directly into the flue gas stream. No heating of the probe was required as duct temperatures were within the specified 200° to 375° F. range. Sampling was performed at a constant rate of (approximately 0.4 liters/min) for a period of two hours.

After sampling, sorbent traps were removing from the probe, both ends were plugged, and traps were then placed into clean sample storage containers.

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Each trap was then acid leached and the resulting leachate analyzed by cold vapor atomic fluorescence spectrometry (CVAFS) detection.

Copies of all sample analysis sheets are appended to this report.

Calculations were performed on a computer and by hand. An explanation of the nomenclature and calculations along with the complete test results are appended. Also appended are the calibration data and copies of the raw field data sheets.

Raw data are kept on file at the GE Energy office in Elmhurst, Illinois. All samples from this test program (not already used in analysis) will be retained for 60 days after the submittal of the report, after which they will be discarded unless GE Energy is advised otherwise.

5.0 QUALITY ASSURANCE PROCEDURES

GE Energy recognizes the previously described reference methods to be very technique oriented and attempts to minimize all factors which can increase error by implementing its Quality Assurance Program into every segment of its testing activities.

Shelf life of chemical reagents prepared at the GE Energy laboratory or at the jobsite did not exceed those specified in the above mentioned methods; and, those reagents having a shelf life of one week were prepared daily at the jobsite. When on-site analyses were required, all reagent standardizations were performed daily by the same person performing the analysis.

Dry and wet test meters were calibrated according to methods described in the Quality Assurance Handbook, Sections 3.3.2, 3.4.2 and 3.5.2. Percent error for the wet test meter according to the methods was less than the allowable error of 1.0 percent. The dry test meters measured the test sample volumes to within 2 percent at the flowrate and conditions encountered during sampling.

6.0 TEST RESULTS SUMMARY

GE Energy

PARTICULATE TEST RESULTS SUMMARY

Company: We Energies
Plant: Presque Isle Power Plant
Unit: Baghouse Inlet

Test Run Number	1	2	3	Average
Source Condition	Normal	Normal	Normal	
Date	02/16/2006	02/16/2006	02/16/2006	
Start Time	8:30	11:20	14:00	
End Time	9:54	13:12	15:17	
Filterable PM:				
grains/dscf	0.0142	0.0174	0.0235	0.0183
lb/hr	84.868	104.438	141.192	110.166
lb/mmBtu	0.0270	0.0329	0.0442	0.0347
Stack Parameters:				
Gas Volumetric Flow Rate, acfm	1,238,832	1,232,324	1,224,983	1,232,047
Gas Volumetric Flow Rate, dscfm	699,058	701,495	702,104	700,886
Average Gas Temperature, °F	337.3	331.3	333.3	334.0
Average Gas Velocity, ft/sec	61.268	60.947	60.584	60.933
Flue Gas Moisture, percent by volume	11.6	11.5	10.7	11.3
Average Flue Pressure, in. Hg	28.84	28.84	28.84	
Barometric Pressure, in. Hg	29.32	29.32	29.32	
Average %CO ₂ by volume, dry basis	13.6	13.8	13.8	13.7
Average %O ₂ by volume, dry basis	5.6	5.5	5.4	5.5
Dry Molecular Wt. of Gas, lb/lb-mole	30.400	30.428	30.424	
Gas Sample Volume, dscf	39.763	41.753	39.855	
Isokinetic Variance	101.8	106.5	101.5	

GE Energy

SPECIATED MERCURY TEST RESULTS SUMMARY

Company: ADA-ES
Plant: We Energies - Presque Isle
Unit: Baghouse Inlet

Test Run Number	1	2	3	Average
Source Condition	Normal	Normal	Normal	
Date	02/14/2006	02/14/2006	02/14/2006	
Start Time	9:25	12:35	15:30	
End Time	12:03	14:56	17:48	
Particle Bound Mercury Emissions				
ppm	0.000005	0.000000	0.000002	0.000002
ug/dscm	0.04	0.00	0.02	0.02
lb/hr	0.00011	0.00000	0.00004	0.00005
lb/mmBtu	0.00000003	0.00000000	0.00000001	0.00000002
lb/Tbtu	0.03438	0.00000	0.01328	0.01589
Elemental Mercury Emissions				
ppm	0.000684	0.000687	0.000730	0.000700
ug/dscm	5.71	5.73	6.09	5.84
lb/hr	0.01510	0.01523	0.01609	0.01547
lb/mmBtu	0.0000047	0.0000047	0.0000047	0.0000047
lb/Tbtu	4.72732	4.71901	4.71901	4.72178
Oxidized Mercury Emissions				
ppm	0.000068	0.000064	0.000057	0.000063
ug/dscm	0.57	0.53	0.48	0.53
lb/hr	0.00151	0.00141	0.00126	0.00139
lb/mmBtu	0.0000005	0.0000004	0.0000004	0.0000004
lb/Tbtu	0.47273	0.43695	0.39844	0.43604
Total Mercury Emissions				
ppm	0.000757	0.000750	0.000789	0.000765
ug/dscm	6.32	6.26	6.58	6.39
lb/hr	0.01672	0.01664	0.01740	0.01692
lb/mmBtu	0.0000052	0.0000052	0.0000055	0.0000053
lb/Tbtu	5.23444	5.15596	5.48958	5.29333
Stack Parameters:				
Average Gas Temperature, °F	331.5	331.3	331.4	331.4
Average Gas Velocity, ft/sec	61.623	61.683	61.582	61.629
Flue Gas Moisture, percent by volume	10.6	10.3	10.6	10.5
Average Flue Pressure, in. Hg	28.44	28.44	28.44	
Barometric Pressure, in. Hg	28.95	28.95	28.95	
Average %CO ₂ by volume, dry basis	13.6	13.8	13.8	13.7
Average %O ₂ by volume, dry basis	5.5	5.4	5.6	5.5
Dry Molecular Wt. of Gas, lb/lb-mole	30.396	30.424	30.432	
Gas Sample Volume, dscf	68.089	66.537	66.529	
Isokinetic Variance	102.6	99.9	100.4	

GE Energy

PARTICULATE TEST RESULTS SUMMARY

Company: We Energies
Plant: Presque Isle Power Plant
Unit: Baghouse Outlet

Test Run Number	1	2	3	Average
Source Condition	Base-Load	Base-Load	Base-Load	
Date	02/16/2006	02/16/2006	02/16/2006	
Start Time	8:30	11:20	14:00	
End Time	9:55	12:45	15:25	
Filterable PM:				
grains/dscf	0.0007	0.0001	0.0001	0.0003
lb/hr	4.179	0.368	0.556	1.701
lb/mmBtu	0.0014	0.0001	0.0002	0.0006
Stack Parameters:				
Gas Volumetric Flow Rate, acfm	1,167,586	1,163,998	1,169,827	1,167,137
Gas Volumetric Flow Rate, dscfm	691,212	688,582	698,186	692,660
Average Gas Temperature, °F	337.8	330.7	331.5	333.3
Average Gas Velocity, ft/sec	61.079	60.891	61.196	61.056
Flue Gas Moisture, percent by volume	9.7	10.5	9.6	9.9
Average Flue Pressure, in. Hg	29.62	29.62	29.62	
Barometric Pressure, in. Hg	29.40	29.40	29.40	
Average %CO ₂ by volume, dry basis	13.1	13.2	13.1	13.1
Average %O ₂ by volume, dry basis	5.7	5.8	5.8	5.8
Dry Molecular Wt. of Gas, lb/lb-mole	30.324	30.344	30.328	
Gas Sample Volume, dscf	50.312	49.443	49.800	
Isokinetic Variance	104.9	103.5	102.8	

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HALOGEN TEST RESULTS SUMMARY

Company: We Energies
Plant: Presque Isle Power Plant
Unit: Baghouse Outlet

Test Run Number	1	2	3	Average
Source Condition	Base-Load	Base-Load	Base-Load	
Date	02/16/2006	02/16/2006	02/16/2006	
Start Time	8:30	11:20	14:00	
End Time	9:55	12:45	15:25	
HCl Emissions:				
ppm:	3.79	3.90	3.73	3.81
lb/hr	14.9018	15.2718	14.7991	14.9909
lb/mmBtu	0.0048	0.0050	0.0048	0.0049
HBr Emissions:				
ppm:	0.16	0.00	0.00	0.05
lb/hr	1.3811	0.0000	0.0000	0.4604
lb/mmBtu	0.0004	0.0000	0.0000	0.0001
Cl₂ Emissions:				
ppm:	0.00	0.00	0.00	0.00
lb/hr	0.0000	0.0000	0.0000	0.0000
lb/mmBtu	0.0000	0.0000	0.0000	0.0000
Br₂ Emissions:				
ppm:	0.00	0.00	0.00	0.00
lb/hr	0.0000	0.0000	0.0000	0.0000
lb/mmBtu	0.0000	0.0000	0.0000	0.0000
Stack Parameters:				
Gas Volumetric Flow Rate, acfm	1,167,586	1,163,998	1,169,827	1,167,137
Gas Volumetric Flow Rate, dscfm	691,212	688,582	698,186	692,660
Average Gas Temperature, °F	337.8	330.7	331.5	333.3
Average Gas Velocity, ft/sec	61.079	60.891	61.196	61.056
Flue Gas Moisture, percent by volume	9.7	10.5	9.6	9.9
Average Flue Pressure, in. Hg	29.62	29.62	29.62	
Barometric Pressure, in. Hg	29.40	29.40	29.40	
Average %CO ₂ by volume, dry basis	13.1	13.2	13.1	13.1
Average %O ₂ by volume, dry basis	5.7	5.8	5.8	5.8
Dry Molecular Wt. of Gas, lb/lb-mole	30.324	30.344	30.328	
Gas Sample Volume, dscf	50.312	49.443	49.800	
Isokinetic Variance	104.9	103.5	102.8	

GE Energy

SPECIATED MERCURY TEST RESULTS SUMMARY

Company: ADA-ES
Plant: We Energies - Presque Isle
Unit: Baghouse Outlet

Test Run Number	1	2	3	Average
Source Condition	Base-Load	Base-Load	Base-Load	
Date	02/14/2006	02/14/2006	02/14/2006	
Start Time	9:25	12:35	15:30	
End Time	11:52	14:55	17:48	
Particle Bound Mercury Emissions				
ppm	0.000001	0.000001	0.000001	0.000001
ug/dscm	0.01	0.01	0.00	0.01
lb/hr	0.00002	0.00002	0.00001	0.00002
lb/inmBtu	0.0000000	0.0000000	0.0000000	0.0000000
lb/Tbtu	0.00756	0.00756	0.00374	0.00629
Elemental Mercury Emissions				
ppm	0.000070	0.000075	0.000080	0.000075
ug/dscm	0.59	0.63	0.66	0.63
lb/hr	0.00151	0.00160	0.00170	0.00160
lb/mmBtu	0.0000005	0.0000005	0.0000005	0.0000005
lb/Tbtu	0.49161	0.52899	0.52899	0.51653
Oxidized Mercury Emissions				
ppm	0.000524	0.000589	0.000531	0.000548
ug/dscm	4.37	4.92	4.43	4.57
lb/hr	0.01124	0.01261	0.01135	0.01173
lb/mmBtu	0.0000037	0.0000042	0.0000037	0.0000039
lb/Tbtu	3.66814	4.15637	3.74307	3.85586
Total Mercury Emissions				
ppm	0.000595	0.000665	0.000611	0.000624
ug/dscm	4.96	5.55	5.10	5.21
lb/hr	0.01278	0.01423	0.01307	0.01336
lb/mmBtu	0.0000042	0.0000047	0.0000043	0.0000044
lb/Tbtu	4.16731	4.69292	4.30827	4.38950
Stack Parameters:				
Average Gas Temperature, °F	331.7	331.9	334.8	332.8
Average Gas Velocity, ft/sec	60.893	61.315	61.541	61.250
Flue Gas Moisture, percent by volume	9.0	10.0	10.0	9.7
Average Flue Pressure, in. Hg	29.11	29.11	29.11	
Barometric Pressure, in. Hg	28.89	28.89	28.89	
Average %CO ₂ by volume, dry basis	13.4	13.3	13.2	13.3
Average %O ₂ by volume, dry basis	5.7	5.8	5.8	5.8
Dry Molecular Wt. of Gas, lb/lb-mole	30.372	30.360	30.344	
Gas Sample Volume, dscf	78.397	78.981	79.729	
Isokinetic Variance	101.5	102.7	103.7	

**We Energies
Presque Isle Power Plant
February 15, 2006**

Method 324 Test Result Summary

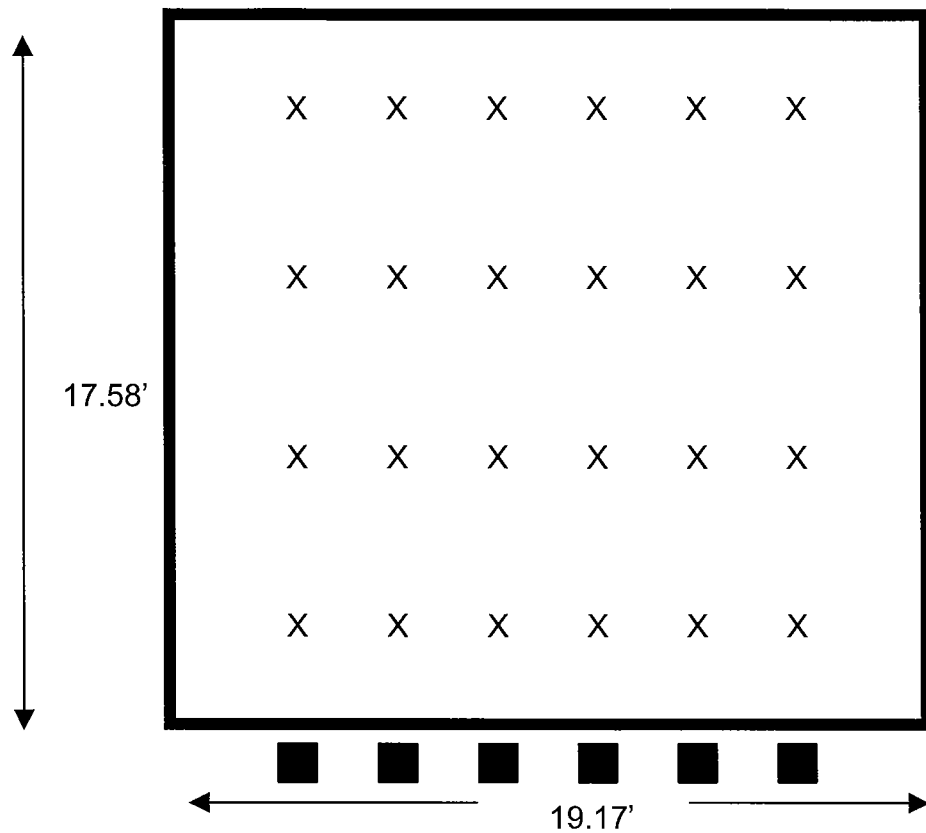
Unit	Unit 7 Inlet				Unit 8 Inlet				Unit 9 Inlet			
	Test 1	Test 2	Test 3	Average	Test 1	Test 2	Test 3	Average	Test 1	Test 2	Test 3	Average
Hg ppm	0.00012	0.00009	0.00008	0.00010	0.00009	0.00007	0.00007	0.00008	0.00211	0.00550	0.00210	0.00323
Hg ug/l	0.00096	0.00074	0.00070	0.00080	0.00073	0.00061	0.00501	0.00212	0.01758	0.04589	0.01752	0.02700

Unit	Baghouse Outlet				
	Test 1*	Test 2	Test 3	Test 4	Average
Hg ppm	0.00072	0.00034	0.00063	0.00066	0.00054
Hg ug/l	0.00597	0.00287	0.00524	0.00554	0.00455

* Test 1 is not included in average

APPENDIX

EQUAL AREA TRAVERSE FOR RECTANGULAR DUCTS



Job: We Energies
Marquette, Michigan

Date: February 14 through 16, 2006

Area: 336.996 Square Feet

Test Location: Baghouse Inlet

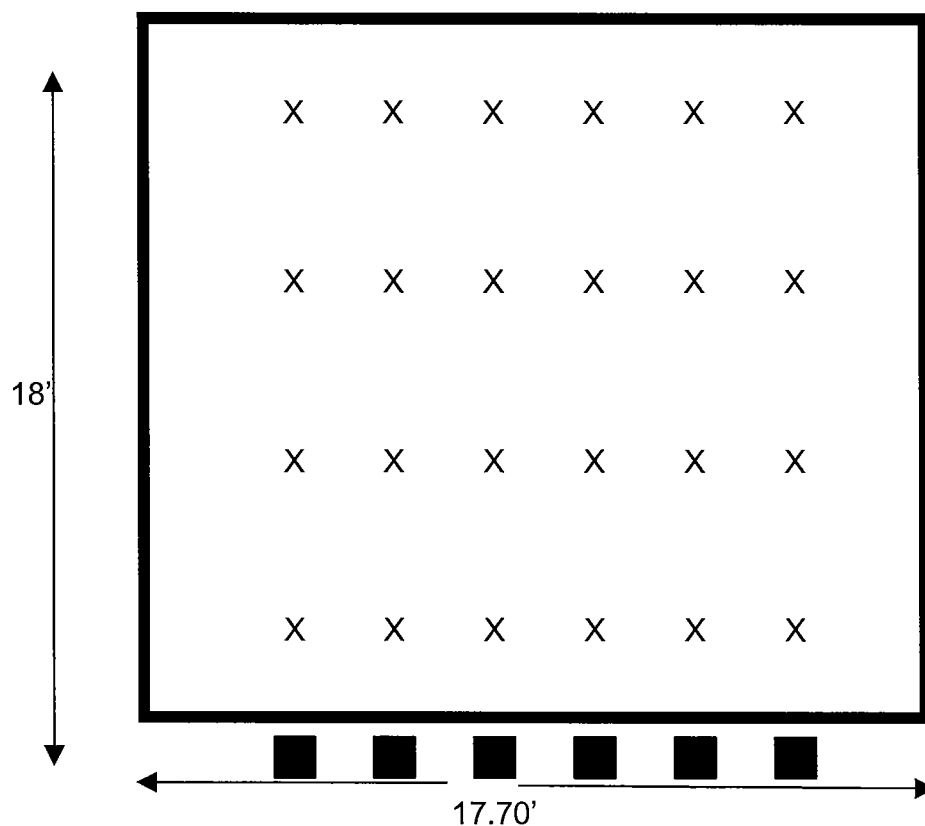
No. Test Ports: 4

Length: 17.58 Feet

Tests Points per Port: 6

Width: 19.17 Feet

EQUAL AREA TRAVERSE FOR RECTANGULAR DUCTS



Job: We Energies
Marquette, Michigan

Date: February 14 through 16, 2006

Area: 318.600 Square Feet

Test Location: Baghouse Outlet

No. Test Ports: 6

Length: 18.0 Feet

Tests Points per Port: 4

Width: 17.70 Feet

ADA COC

ADA ID	Field ID	Project	Unit	Date	Type	Location	Comments	% LOI	Hg (ng/g)
4794	PIPP37	7005-74	7	2/14/06 0:00	Fly Ash	ESP-7A	Base line testing	0.66	<10
4795	PIPP38	7005-74	7	2/14/06 0:00	Fly Ash	ESP-7B	Base line testing	0.61	<10
4796	PIPP39	7005-74	7	2/14/06 0:00	Fly Ash	ESP-7C	Base line testing	0.64	<10
4797	PIPP40	7005-74	7	2/14/06 0:00	Fly Ash	ESP-7D	Base line testing	0.7	<10
4798	PIPP41	7005-74	7	2/14/06 0:00	Fly Ash	ESP-7E	Base line testing	0.73	<10
4799	PIPP42	7005-74	7	2/14/06 0:00	Fly Ash	ESP-7F	Base line testing	0.67	<10
4800	PIPP43	7005-74	7	2/14/06 0:00	Fly Ash	ESP-7G	Base line testing	0.72	<10
4801	PIPP44	7005-74	7	2/14/06 0:00	Fly Ash	ESP-7H	Base line testing	0.63	<10
4802	PIPP45	7005-74	7	2/14/06 0:00	Fly Ash	ESP-7I	Base line testing	0.71	<10
4803	PIPP46	7005-74	7	2/14/06 0:00	Fly Ash	ESP-7J	Base line testing	0.73	<10
4804	PIPP47	7005-74	7	2/14/06 0:00	Fly Ash	ESP-7K	Base line testing	0.74	<10
4805	PIPP48	7005-74	7	2/14/06 0:00	Fly Ash	ESP-7L	Base line testing	0.85	<10
4806	PIPP49	7005-74	8	2/15/06 0:00	Fly Ash	ESP-8A	Base line testing	1.15	<10
4807	PIPP50	7005-74	8	2/15/06 0:00	Fly Ash	ESP-8B	Base line testing	0.99	<10
4808	PIPP51	7005-74	8	2/15/06 0:00	Fly Ash	ESP-8C	Base line testing	0.67	<10
4809	PIPP52	7005-74	8	2/15/06 0:00	Fly Ash	ESP-8D	Base line testing	0.8	<10
4810	PIPP53	7005-74	8	2/15/06 0:00	Fly Ash	ESP-8E	Base line testing	0.86	<10
4811	PIPP54	7005-74	8	2/15/06 0:00	Fly Ash	ESP-8F	Base line testing	0.82	<10
4812	PIPP55	7005-74	8	2/15/06 0:00	Fly Ash	ESP-8G	Base line testing	0.71	<10
4813	PIPP56	7005-74	8	2/15/06 0:00	Fly Ash	ESP-8H	Base line testing	0.68	<10
4814	PIPP57	7005-74	8	2/15/06 0:00	Fly Ash	ESP-8I	Base line testing	0.84	<10
4815	PIPP58	7005-74	8	2/15/06 0:00	Fly Ash	ESP-8J	Base line testing	0.8	<10
4816	PIPP59	7005-74	8	2/15/06 0:00	Fly Ash	ESP-8K	Base line testing	0.79	<10
4817	PIPP60	7005-74	8	2/15/06 0:00	Fly Ash	ESP-8L	Base line testing	0.74	<10
4818	PIPP61	7005-74	9	2/16/06 0:00	Fly Ash	ESP-9A	Base line testing	1.5	<10
4819	PIPP62	7005-74	9	2/16/06 0:00	Fly Ash	ESP-9B	Base line testing	1.15	<10
4820	PIPP63	7005-74	9	2/16/06 0:00	Fly Ash	ESP-9C	Base line testing	0.65	<10
4821	PIPP64	7005-74	9	2/16/06 0:00	Fly Ash	ESP-9D	Base line testing	1.05	<10
4822	PIPP65	7005-74	9	2/16/06 0:00	Fly Ash	ESP-9E	Base line testing	1.19	<10
4823	PIPP66	7005-74	9	2/16/06 0:00	Fly Ash	ESP-9F	Base line testing	1.21	<10
4824	PIPP67	7005-74	9	2/16/06 0:00	Fly Ash	ESP-9G	Base line testing	0.83	<10
4825	PIPP68	7005-74	9	2/16/06 0:00	Fly Ash	ESP-9H	Base line testing	0.66	<10
4826	PIPP69	7005-74	9	2/16/06 0:00	Fly Ash	ESP-9I	Base line testing	0.94	<10
4827	PIPP70	7005-74	9	2/16/06 0:00	Fly Ash	ESP-9J	Base line testing	1.14	<10
4828	PIPP71	7005-74	9	2/16/06 0:00	Fly Ash	ESP-9K	Base line testing	0.77	<10
4829	PIPP72	7005-74	9	2/16/06 0:00	Fly Ash	ESP-9L	Base line testing	0.74	<10
4830	PIPP73	7005-74		2/14/06 0:00	Fly Ash	BH-1	Base line testing	11.04	4690

ADA COC

ADA ID	Field ID	Project	Unit	Date	Type	Location	Comments	% LOI	Hg (ng/g)
4831	PIPP74	7005-74		2/14/06 0:00	Fly Ash	BH-2	Base line testing	10.87	5590
4832	PIPP75	7005-74		2/14/06 0:00	Fly Ash	BH-3	Base line testing	6.62	3620
4833	PIPP76	7005-74		2/14/06 0:00	Fly Ash	BH-4	Base line testing	10.85	9330
4834	PIPP77	7005-74		2/14/06 0:00	Fly Ash	BH-5	Base line testing	6.94	4290
4835	PIPP78	7005-74		2/14/06 0:00	Fly Ash	BH-6	Base line testing	12.99	2810
4836	PIPP79	7005-74		2/14/06 0:00	Fly Ash	BH-7	Base line testing	11.59	1790
4837	PIPP80	7005-74		2/14/06 0:00	Fly Ash	BH-8	Base line testing	12.72	7830
4838	PIPP81	7005-74		2/14/06 0:00	Fly Ash	BH-9	Base line testing	15.33	14100
4839	PIPP82	7005-74		2/14/06 0:00	Fly Ash	BH-10	Base line testing	17.85	8580
4840	PIPP83	7005-74		2/15/06 0:00	Fly Ash	BH-1	Base line testing	11.49	4770
4841	PIPP84	7005-74		2/15/06 0:00	Fly Ash	BH-2	Base line testing	11.03	6010
4842	PIPP85	7005-74		2/15/06 0:00	Fly Ash	BH-3	Base line testing	7.05	3380
4843	PIPP86	7005-74		2/15/06 0:00	Fly Ash	BH-4	Base line testing	12.03	6040
4844	PIPP87	7005-74		2/15/06 0:00	Fly Ash	BH-5	Base line testing	8.38	6320
4845	PIPP88	7005-74		2/15/06 0:00	Fly Ash	BH-6	Base line testing	12.7	2420
4846	PIPP89	7005-74		2/15/06 0:00	Fly Ash	BH-7	Base line testing	9.64	1820
4847	PIPP90	7005-74		2/15/06 0:00	Fly Ash	BH-8	Base line testing	11.17	3460
4848	PIPP91	7005-74		2/15/06 0:00	Fly Ash	BH-9	Base line testing	15.48	9320
4849	PIPP92	7005-74		2/15/06 0:00	Fly Ash	BH-10	Base line testing	13.31	7550
4850	PIPP93	7005-74		2/16/06 0:00	Fly Ash	BH-1	Base line testing	9.7	2700
4851	PIPP94	7005-74		2/16/06 0:00	Fly Ash	BH-2	Base line testing	12.45	4010
4852	PIPP95	7005-74		2/16/06 0:00	Fly Ash	BH-3	Base line testing	16.07	3020
4853	PIPP96	7005-74		2/16/06 0:00	Fly Ash	BH-4	Base line testing	18.52	4780
4854	PIPP97	7005-74		2/16/06 0:00	Fly Ash	BH-5	Base line testing	11.5	5480
4855	PIPP98	7005-74		2/16/06 0:00	Fly Ash	BH-6	Base line testing	6.89	2170
4856	PIPP99	7005-74		2/16/06 0:00	Fly Ash	BH-7	Base line testing	6.88	1950
4857	PIPP100	7005-74		2/16/06 0:00	Fly Ash	BH-8	Base line testing	12.77	2530
4858	PIPP101	7005-74		2/16/06 0:00	Fly Ash	BH-9	Base line testing	13.39	3670
4859	PIPP102	7005-74		2/16/06 0:00	Fly Ash	BH-10	Base line testing	11.57	1920

Mercury

ADA ID	Field ID	Project	Unit	Date	Type	Location	Comments	Hg (ng/g dry)
4758	PIPP1	7005-74	7	2/14/06 0:00	Coal	UNIT 7 - A1	Base line testing - uncrushed coal	69
4759	PIPP2	7005-74	7	2/14/06 0:00	Coal	UNIT 7 - A2	Base line testing - uncrushed coal	87.4
4760	PIPP3	7005-74	7	2/14/06 0:00	Coal	UNIT 7 - B1	Base line testing - uncrushed coal	52.2
4761	PIPP4	7005-74	7	2/14/06 0:00	Coal	UNIT 7 - B2	Base line testing - uncrushed coal	80.7
4762	PIPP5	7005-74	8	2/14/06 0:00	Coal	UNIT 8 - A1	Base line testing - uncrushed coal	58.6
4763	PIPP6	7005-74	8	2/14/06 0:00	Coal	UNIT 8 - A2	Base line testing - uncrushed coal	48.4
4764	PIPP7	7005-74	8	2/14/06 0:00	Coal	UNIT 8 - B1	Base line testing - uncrushed coal	53
4765	PIPP8	7005-74	8	2/14/06 0:00	Coal	UNIT 8 - B2	Base line testing - uncrushed coal	55.9
4766	PIPP9	7005-74	9	2/14/06 0:00	Coal	UNIT 9 - A1	Base line testing - uncrushed coal	61.8
4767	PIPP10	7005-74	9	2/14/06 0:00	Coal	UNIT 9 - A2	Base line testing - uncrushed coal	60.9
4768	PIPP11	7005-74	9	2/14/06 0:00	Coal	UNIT 9 - B1	Base line testing - uncrushed coal	53.4
4769	PIPP12	7005-74	9	2/14/06 0:00	Coal	UNIT 9 - B2	Base line testing - uncrushed coal	52.5
4770	PIPP13	7005-74	7	2/15/06 0:00	Coal	UNIT 7 - A1	Base line testing - uncrushed coal	53.5
4771	PIPP14	7005-74	7	2/15/06 0:00	Coal	UNIT 7 - A2	Base line testing - uncrushed coal	73.2
4772	PIPP15	7005-74	7	2/15/06 0:00	Coal	UNIT 7 - B1	Base line testing - uncrushed coal	48.9
4773	PIPP16	7005-74	7	2/15/06 0:00	Coal	UNIT 7 - B2	Base line testing - uncrushed coal	46.9
4774	PIPP17	7005-74	8	2/15/06 0:00	Coal	UNIT 8 - A1	Base line testing - uncrushed coal	47.6
4775	PIPP18	7005-74	8	2/15/06 0:00	Coal	UNIT 8 - A2	Base line testing - uncrushed coal	53.6
4776	PIPP19	7005-74	8	2/15/06 0:00	Coal	UNIT 8 - B1	Base line testing - uncrushed coal	89.3
4777	PIPP20	7005-74	8	2/15/06 0:00	Coal	UNIT 8 - B2	Base line testing - uncrushed coal	59.6
4778	PIPP21	7005-74	9	2/15/06 0:00	Coal	UNIT 9 - A1	Base line testing - uncrushed coal	55.7
4779	PIPP22	7005-74	9	2/15/06 0:00	Coal	UNIT 9 - A2	Base line testing - uncrushed coal	54.4
4780	PIPP23	7005-74	9	2/15/06 0:00	Coal	UNIT 9 - B1	Base line testing - uncrushed coal	57.2
4781	PIPP24	7005-74	9	2/15/06 0:00	Coal	UNIT 9 - B2	Base line testing - uncrushed coal	60.5
4782	PIPP25	7005-74	7	2/16/06 0:00	Coal	UNIT 7 - A1	Base line testing - uncrushed coal	56.6
4783	PIPP26	7005-74	7	2/16/06 0:00	Coal	UNIT 7 - A2	Base line testing - uncrushed coal	35.1
4784	PIPP27	7005-74	7	2/16/06 0:00	Coal	UNIT 7 - B1	Base line testing - uncrushed coal	58.2
4785	PIPP28	7005-74	7	2/16/06 0:00	Coal	UNIT 7 - B2	Base line testing - uncrushed coal	44.9
4786	PIPP29	7005-74	8	2/16/06 0:00	Coal	UNIT 8 - A1	Base line testing - uncrushed coal	60.8
4787	PIPP30	7005-74	8	2/16/06 0:00	Coal	UNIT 8 - A2	Base line testing - uncrushed coal	63.9
4788	PIPP31	7005-74	8	2/16/06 0:00	Coal	UNIT 8 - B1	Base line testing - uncrushed coal	51.4
4789	PIPP32	7005-74	8	2/16/06 0:00	Coal	UNIT 8 - B2	Base line testing - uncrushed coal	62.1
4790	PIPP33	7005-74	9	2/16/06 0:00	Coal	UNIT 9 - A1	Base line testing - uncrushed coal	51.1

Mercury

ADA ID	Field ID	Project	Unit	Date	Type	Location	Comments	Hg (ng/g dry)
4791	PIPP34	7005-74	9	2/16/06 0:00	Coal	UNIT 9 - A2	Base line testing - uncrushed coal	58.9
4792	PIPP35	7005-74	9	2/16/06 0:00	Coal	UNIT 9 - B1	Base line testing - uncrushed coal	43.6
4793	PIPP36	7005-74	9	2/16/06 0:00	Coal	UNIT 9 - B2	Base line testing - uncrushed coal	47.9
4894	4759DUP	7005-74	7	2/14/06 0:00	Coal	UNIT 7 - A2	Duplicate of 4759	60.4
4895	4776DUP	7005-74	8	2/15/06 0:00	Coal	UNIT 8 - B1	Duplicate of 4776	41.3
4896	4790DUP	7005-74	9	2/16/06 0:00	Coal	UNIT 9 - A1	Duplicate of 4790	36

Halogens

ADA ID	Field ID	Project	Unit	Date	Type	Location	Comments	Cl (ug/g)
4758	PIPP1	7005-74	7	2/14/06 0:00	Coal	UNIT 7 - A1	Base line testing - uncrushed coal	46.72
4759	PIPP2	7005-74	7	2/14/06 0:00	Coal	UNIT 7 - A2	Base line testing - uncrushed coal	68.64
4760	PIPP3	7005-74	7	2/14/06 0:00	Coal	UNIT 7 - B1	Base line testing - uncrushed coal	70.39
4761	PIPP4	7005-74	7	2/14/06 0:00	Coal	UNIT 7 - B2	Base line testing - uncrushed coal	82.86
4762	PIPP5	7005-74	8	2/14/06 0:00	Coal	UNIT 8 - A1	Base line testing - uncrushed coal	115.96
4763	PIPP6	7005-74	8	2/14/06 0:00	Coal	UNIT 8 - A2	Base line testing - uncrushed coal	104.47
4764	PIPP7	7005-74	8	2/14/06 0:00	Coal	UNIT 8 - B1	Base line testing - uncrushed coal	68.58
4765	PIPP8	7005-74	8	2/14/06 0:00	Coal	UNIT 8 - B2	Base line testing - uncrushed coal	113.48
4766	PIPP9	7005-74	9	2/14/06 0:00	Coal	UNIT 9 - A1	Base line testing - uncrushed coal	69.69
4767	PIPP10	7005-74	9	2/14/06 0:00	Coal	UNIT 9 - A2	Base line testing - uncrushed coal	91.31
4768	PIPP11	7005-74	9	2/14/06 0:00	Coal	UNIT 9 - B1	Base line testing - uncrushed coal	63.86
4769	PIPP12	7005-74	9	2/14/06 0:00	Coal	UNIT 9 - B2	Base line testing - uncrushed coal	64.35
4770	PIPP13	7005-74	7	2/15/06 0:00	Coal	UNIT 7 - A1	Base line testing - uncrushed coal	49
4771	PIPP14	7005-74	7	2/15/06 0:00	Coal	UNIT 7 - A2	Base line testing - uncrushed coal	53.99
4772	PIPP15	7005-74	7	2/15/06 0:00	Coal	UNIT 7 - B1	Base line testing - uncrushed coal	61.62
4773	PIPP16	7005-74	7	2/15/06 0:00	Coal	UNIT 7 - B2	Base line testing - uncrushed coal	77.72
4774	PIPP17	7005-74	8	2/15/06 0:00	Coal	UNIT 8 - A1	Base line testing - uncrushed coal	76.67
4775	PIPP18	7005-74	8	2/15/06 0:00	Coal	UNIT 8 - A2	Base line testing - uncrushed coal	81.46
4776	PIPP19	7005-74	8	2/15/06 0:00	Coal	UNIT 8 - B1	Base line testing - uncrushed coal	66.24
4777	PIPP20	7005-74	8	2/15/06 0:00	Coal	UNIT 8 - B2	Base line testing - uncrushed coal	100.73
4778	PIPP21	7005-74	9	2/15/06 0:00	Coal	UNIT 9 - A1	Base line testing - uncrushed coal	85.1
4779	PIPP22	7005-74	9	2/15/06 0:00	Coal	UNIT 9 - A2	Base line testing - uncrushed coal	60.01
4780	PIPP23	7005-74	9	2/15/06 0:00	Coal	UNIT 9 - B1	Base line testing - uncrushed coal	73.14
4781	PIPP24	7005-74	9	2/15/06 0:00	Coal	UNIT 9 - B2	Base line testing - uncrushed coal	54.39
4782	PIPP25	7005-74	7	2/16/06 0:00	Coal	UNIT 7 - A1	Base line testing - uncrushed coal	49.38
4783	PIPP26	7005-74	7	2/16/06 0:00	Coal	UNIT 7 - A2	Base line testing - uncrushed coal	48.58
4784	PIPP27	7005-74	7	2/16/06 0:00	Coal	UNIT 7 - B1	Base line testing - uncrushed coal	74.89
4785	PIPP28	7005-74	7	2/16/06 0:00	Coal	UNIT 7 - B2	Base line testing - uncrushed coal	43.13
4786	PIPP29	7005-74	8	2/16/06 0:00	Coal	UNIT 8 - A1	Base line testing - uncrushed coal	74.67
4787	PIPP30	7005-74	8	2/16/06 0:00	Coal	UNIT 8 - A2	Base line testing - uncrushed coal	65.39
4788	PIPP31	7005-74	8	2/16/06 0:00	Coal	UNIT 8 - B1	Base line testing - uncrushed coal	64.24
4789	PIPP32	7005-74	8	2/16/06 0:00	Coal	UNIT 8 - B2	Base line testing - uncrushed coal	81.06
4790	PIPP33	7005-74	9	2/16/06 0:00	Coal	UNIT 9 - A1	Base line testing - uncrushed coal	80.06

Halogens

ADA ID	Field ID	Project	Unit	Date	Type	Location	Comments	Cl (ug/g)
4791	PIPP34	7005-74	9	2/16/06 0:00	Coal	UNIT 9 - A2	Base line testing - uncrushed coal	56.21
4792	PIPP35	7005-74	9	2/16/06 0:00	Coal	UNIT 9 - B1	Base line testing - uncrushed coal	75.49
4793	PIPP36	7005-74	9	2/16/06 0:00	Coal	UNIT 9 - B2	Base line testing - uncrushed coal	78.19
4894	4759DUP	7005-74	7	2/14/06 0:00	Coal	UNIT 7 - A2	Duplicate of 4759	68.12
4895	4776DUP	7005-74	8	2/15/06 0:00	Coal	UNIT 8 - B1	Duplicate of 4776	47.24
4896	4790DUP	7005-74	9	2/16/06 0:00	Coal	UNIT 9 - A1	Duplicate of 4790	82.79

ADA ID	Field ID	Project	Unit	Date	Type	Location	Comments	% Ash (as rec)	% Ash (dry)	% C (as rec)	% C (dry)	% H (as rec)	% H (dry)	% H ₂ O (as rec)	% N (as rec)	% N (dry)	% O (as rec)	% O (dry)	% S (as rec)	% S (dry)
4758	PIPP1	7005-74	7	2/14/06 0:00	Coal	UNIT 7 - A1	Base line testing - uncrushed coal	4.29	5.84	52.67	71.72	3.64	4.96	26.56	0.68	0.92	11.90	16.21	0.26	0.35
4759	PIPP2	7005-74	7	2/14/06 0:00	Coal	UNIT 7 - A2	Base line testing - uncrushed coal	4.16	5.68	52.57	71.74	3.66	5.00	26.72	0.70	0.95	11.90	16.23	0.29	0.40
4760	PIPP3	7005-74	7	2/14/06 0:00	Coal	UNIT 7 - B1	Base line testing - uncrushed coal	4.61	6.26	52.36	71.14	3.59	4.88	26.40	0.68	0.93	12.10	16.44	0.26	0.35
4761	PIPP4	7005-74	7	2/14/06 0:00	Coal	UNIT 7 - B2	Base line testing - uncrushed coal	4.86	6.66	51.77	70.97	3.55	4.86	27.05	0.69	0.94	11.80	16.18	0.28	0.39
4762	PIPP5	7005-74	8	2/14/06 0:00	Coal	UNIT 8 - A1	Base line testing - uncrushed coal	4.62	6.29	52.68	71.66	3.65	4.97	26.48	0.70	0.95	11.59	15.75	0.28	0.38
4763	PIPP6	7005-74	8	2/14/06 0:00	Coal	UNIT 8 - A2	Base line testing - uncrushed coal	4.44	6.04	52.39	71.34	3.64	4.95	26.56	0.69	0.94	12.02	16.38	0.26	0.35
4764	PIPP7	7005-74	8	2/14/06 0:00	Coal	UNIT 8 - B1	Base line testing - uncrushed coal	4.68	6.42	51.58	70.77	3.58	4.91	27.12	0.67	0.92	12.11	16.62	0.26	0.36
4765	PIPP8	7005-74	8	2/14/06 0:00	Coal	UNIT 8 - B2	Base line testing - uncrushed coal	4.62	6.28	51.96	70.58	3.60	4.89	26.38	0.68	0.92	12.49	16.97	0.27	0.36
4766	PIPP9	7005-74	9	2/14/06 0:00	Coal	UNIT 9 - A1	Base line testing - uncrushed coal	4.69	6.36	52.28	70.94	3.64	4.94	26.31	0.69	0.94	12.13	16.47	0.26	0.35
4767	PIPP10	7005-74	9	2/14/06 0:00	Coal	UNIT 9 - A2	Base line testing - uncrushed coal	5.16	6.94	52.30	70.29	3.62	4.86	25.59	0.70	0.94	12.34	16.58	0.29	0.39
4768	PIPP11	7005-74	9	2/14/06 0:00	Coal	UNIT 9 - B1	Base line testing - uncrushed coal	4.44	6.07	52.01	71.03	3.67	5.01	26.78	0.69	0.94	12.15	16.59	0.26	0.36
4769	PIPP12	7005-74	9	2/14/06 0:00	Coal	UNIT 9 - B2	Base line testing - uncrushed coal	4.41	6.04	51.73	70.78	3.62	4.95	26.91	0.69	0.94	12.38	16.94	0.26	0.35
4770	PIPP13	7005-74	7	2/15/06 0:00	Coal	UNIT 7 - A1	Base line testing - uncrushed coal	4.57	6.23	52.12	71.09	3.64	4.96	26.68	0.70	0.95	12.03	16.41	0.26	0.36
4771	PIPP14	7005-74	7	2/15/06 0:00	Coal	UNIT 7 - A2	Base line testing - uncrushed coal	4.23	5.75	52.52	71.38	3.72	5.05	26.42	0.69	0.94	12.15	16.51	0.27	0.37
4772	PIPP15	7005-74	7	2/15/06 0:00	Coal	UNIT 7 - B1	Base line testing - uncrushed coal	4.45	6.06	52.38	71.29	3.65	4.97	26.52	0.71	0.96	12.02	16.35	0.27	0.37
4773	PIPP16	7005-74	7	2/15/06 0:00	Coal	UNIT 7 - B2	Base line testing - uncrushed coal	4.40	6.00	52.23	71.25	3.58	4.88	26.70	0.70	0.95	12.13	16.57	0.26	0.35
4774	PIPP17	7005-74	8	2/15/06 0:00	Coal	UNIT 8 - A1	Base line testing - uncrushed coal	4.49	6.09	52.60	71.40	3.60	4.89	26.33	0.72	0.98	11.99	16.27	0.27	0.37
4775	PIPP18	7005-74	8	2/15/06 0:00	Coal	UNIT 8 - A2	Base line testing - uncrushed coal	4.81	6.53	52.18	70.86	3.57	4.85	26.36	0.69	0.94	12.12	16.46	0.27	0.36
4776	PIPP19	7005-74	8	2/15/06 0:00	Coal	UNIT 8 - B1	Base line testing - uncrushed coal	5.10	6.86	52.77	70.97	3.64	4.89	25.64	0.69	0.93	11.89	15.99	0.27	0.36
4777	PIPP20	7005-74	8	2/15/06 0:00	Coal	UNIT 8 - B2	Base line testing - uncrushed coal	4.76	6.55	51.62	71.09	3.55	4.89	27.39	0.70	0.97	11.70	16.11	0.28	0.39
4778	PIPP21	7005-74	9	2/15/06 0:00	Coal	UNIT 9 - A1	Base line testing - uncrushed coal	4.93	6.68	52.44	71.12	3.57	4.84	26.26	0.71	0.96	11.80	16.00	0.29	0.40
4779	PIPP22	7005-74	9	2/15/06 0:00	Coal	UNIT 9 - A2	Base line testing - uncrushed coal	4.35	6.00	51.74	71.44	3.59	4.95	27.57	0.68	0.94	11.82	16.33	0.25	0.34
4780	PIPP23	7005-74	9	2/15/06 0:00	Coal	UNIT 9 - B1	Base line testing - uncrushed coal	4.52	6.12	52.96	71.70	3.62	4.90	26.13	0.72	0.97	11.77	15.93	0.28	0.38
4781	PIPP24	7005-74	9	2/15/06 0:00	Coal	UNIT 9 - B2	Base line testing - uncrushed coal	4.40	6.06	51.64	71.06	3.52	4.84	27.33	0.69	0.95	12.16	16.73	0.26	0.36
4782	PIPP25	7005-74	7	2/16/06 0:00	Coal	UNIT 7 - A1	Base line testing - uncrushed coal	4.58	6.19	52.63	71.17	3.57	4.83	26.05	0.70	0.95	12.23	16.54	0.24	0.32
4783	PIPP26	7005-74	7	2/16/06 0:00	Coal	UNIT 7 - A2	Base line testing - uncrushed coal	4.11	5.56	53.55	72.43	3.62	4.90	26.07	0.70	0.95	11.68	15.80	0.27	0.36
4784	PIPP27	7005-74	7	2/16/06 0:00	Coal	UNIT 7 - B1	Base line testing - uncrushed coal	4.72	6.35	53.34	71.82	3.60	4.85	25.73	0.71	0.96	11.63	15.66	0.27	0.36
4785	PIPP28	7005-74	7	2/16/06 0:00	Coal	UNIT 7 - B2	Base line testing - uncrushed coal	4.16	5.66	52.90	72.02	3.47	4.73	26.55	0.68	0.93	11.98	16.31	0.26	0.35
4786	PIPP29	7005-74	8	2/16/06 0:00	Coal	UNIT 8 - A1	Base line testing - uncrushed coal	4.87	6.58	53.02	71.59	3.54	4.78	25.94	0.70	0.95	11.66	15.73	0.27	0.37
4787	PIPP30	7005-74	8	2/16/06 0:00	Coal	UNIT 8 - A2	Base line testing - uncrushed coal	4.74	6.43	52.94	71.76	3.36	4.55	26.22	0.69	0.93	11.76	15.94	0.29	0.39
4788	PIPP31	7005-74	8	2/16/06 0:00	Coal	UNIT 8 - B1	Base line testing - uncrushed coal	4.54	6.20	52.64	71.88	3.64	4.97	26.77	0.70	0.95	11.45	15.64	0.26	0.36
4789	PIPP32	7005-74	8	2/16/06 0:00	Coal	UNIT 8 - B2	Base line testing - uncrushed coal	4.97	6.83	51.93	71.30	3.50	4.80	27.17	0.69	0.95	11.47	15.75	0.27	0.37
4790	PIPP33	7005-74	9	2/16/06 0:00	Coal	UNIT 9 - A1	Base line testing - uncrushed coal	4.58	6.27	52.23	71.51	3.54	4.84	26.96	0.71	0.97	11.70	16.03	0.28	0.38
4791	PIPP34	7005-74	9	2/16/06 0:00	Coal	UNIT 9 - A2	Base line testing - uncrushed coal	4.94	6.74	52.33	71.42	3.51	4.79	26.73	0.69	0.94	11.52	15.73	0.28	0.38
4792	PIPP35	7005-74	9	2/16/06 0:00	Coal	UNIT 9 - B1	Base line testing - uncrushed coal	4.35	5.97	52.67	72.21	3.52	4.82	27.06	0.70	0.96	11.42	15.65	0.28	0.39
4793	PIPP36	7005-74	9	2/16/06 0:00	Coal	UNIT 9 - B2	Base line testing - uncrushed coal	4.63	6.32	52.39	71.48	3.52	4.80	26.71	0.72	0.98	11.75	16.04	0.28	0.38
4894	4758DU P	7005-74	7	2/14/06 0:00	Coal	UNIT 7 - A2	Duplicate of 4759	4.26	5.77	52.87	71.55	3.59	4.86	26.11	0.69	0.93	12.22	16.54	0.26	0.35
4895	4776DU P	7005-74	8	2/15/06 0:00	Coal	UNIT 8 - B1	Duplicate of 4776	4.43	6.00	52.52	71.16	3.59	4.86	26.19	0.69	0.93	12.32	16.70	0.26	0.35
4896	4780DU P	7005-74	9	2/16/06 0:00	Coal	UNIT 9 - A1	Duplicate of 4790	4.19	5.65	53.53	72.20	3.57	4.81	25.86	0.72	0.97	11.89	16.04	0.24	0.33

ADA ID	Field ID	Project	Unit	Date	Type	Location	Comments	% Ash (as rec)	% Ash (dry)	% FC (as rec)	% FC (dry)	% H2O (as rec)	% S (as rec)	% S (dry)	% Vol (as rec)	% Vol (dry)	BTU/lb (as rec)	BTU/lb (dry)	MAF (BTU/lb)
4758	PIPP1	7005-74	7	2/14/06 0:00	Coal	UNIT 7 - A1	Base line testing - uncrushed coal	4.29	5.84	38.50	52.43	26.56	0.26	0.35	30.65	41.73	9014	12274	13035
4759	PIPP2	7005-74	7	2/14/06 0:00	Coal	UNIT 7 - A2	Base line testing - uncrushed coal	4.16	5.68	38.61	52.69	26.72	0.29	0.40	30.51	41.63	9047	12346	13089
4760	PIPP3	7005-74	7	2/14/06 0:00	Coal	UNIT 7 - B1	Base line testing - uncrushed coal	4.61	6.26	38.70	52.58	26.40	0.26	0.35	30.29	41.16	9012	12245	13063
4761	PIPP4	7005-74	7	2/14/06 0:00	Coal	UNIT 7 - B2	Base line testing - uncrushed coal	4.86	6.66	38.01	52.10	27.05	0.28	0.39	30.08	41.24	8863	12149	13016
4762	PIPP5	7005-74	8	2/14/06 0:00	Coal	UNIT 8 - A1	Base line testing - uncrushed coal	4.62	6.29	38.60	52.50	26.48	0.28	0.38	30.30	41.21	9071	12338	13166
4763	PIPP6	7005-74	8	2/14/06 0:00	Coal	UNIT 8 - A2	Base line testing - uncrushed coal	4.44	6.04	38.44	52.35	26.56	0.26	0.35	30.56	41.61	9031	12297	13087
4764	PIPP7	7005-74	8	2/14/06 0:00	Coal	UNIT 8 - B1	Base line testing - uncrushed coal	4.68	6.42	38.04	52.20	27.12	0.26	0.36	30.16	41.38	8879	12183	13019
4765	PIPP8	7005-74	8	2/14/06 0:00	Coal	UNIT 8 - B2	Base line testing - uncrushed coal	4.62	6.28	38.31	52.03	26.38	0.27	0.36	30.69	41.69	8996	12220	13039
4766	PIPP9	7005-74	9	2/14/06 0:00	Coal	UNIT 9 - A1	Base line testing - uncrushed coal	4.69	6.36	38.62	52.42	26.31	0.26	0.35	30.38	41.22	8980	12186	13014
4767	PIPP10	7005-74	9	2/14/06 0:00	Coal	UNIT 9 - A2	Base line testing - uncrushed coal	5.16	6.94	38.58	51.84	25.59	0.29	0.39	30.67	41.22	8995	12088	12989
4768	PIPP11	7005-74	9	2/14/06 0:00	Coal	UNIT 9 - B1	Base line testing - uncrushed coal	4.44	6.07	38.32	52.33	26.78	0.26	0.36	30.46	41.60	8942	12212	13001
4769	PIPP12	7005-74	9	2/14/06 0:00	Coal	UNIT 9 - B2	Base line testing - uncrushed coal	4.41	6.04	38.32	52.42	26.91	0.26	0.35	30.36	41.54	8947	12241	13028
4770	PIPP13	7005-74	7	2/15/06 0:00	Coal	UNIT 7 - A1	Base line testing - uncrushed coal	4.57	6.23	38.24	52.16	26.68	0.26	0.36	30.51	41.61	8968	12231	13044
4771	PIPP14	7005-74	7	2/15/06 0:00	Coal	UNIT 7 - A2	Base line testing - uncrushed coal	4.23	5.75	38.74	52.65	26.42	0.27	0.37	30.61	41.60	9080	12340	13093
4772	PIPP15	7005-74	7	2/15/06 0:00	Coal	UNIT 7 - B1	Base line testing - uncrushed coal	4.45	6.06	38.45	52.33	26.52	0.27	0.37	30.58	41.61	9021	12277	13069
4773	PIPP16	7005-74	7	2/15/06 0:00	Coal	UNIT 7 - B2	Base line testing - uncrushed coal	4.40	6.00	38.50	52.52	26.70	0.26	0.35	30.40	41.48	8993	12269	13052
4774	PIPP17	7005-74	8	2/15/06 0:00	Coal	UNIT 8 - A1	Base line testing - uncrushed coal	4.49	6.09	38.57	52.36	26.33	0.27	0.37	30.61	41.55	9061	12299	13097
4775	PIPP18	7005-74	8	2/15/06 0:00	Coal	UNIT 8 - A2	Base line testing - uncrushed coal	4.81	6.53	38.50	52.28	26.36	0.27	0.36	30.33	41.19	9009	12234	13089
4776	PIPP19	7005-74	8	2/15/06 0:00	Coal	UNIT 8 - B1	Base line testing - uncrushed coal	5.10	6.86	38.42	51.67	25.64	0.27	0.36	30.84	41.47	9108	12249	13151
4777	PIPP20	7005-74	8	2/15/06 0:00	Coal	UNIT 8 - B2	Base line testing - uncrushed coal	4.76	6.55	38.04	52.40	27.39	0.28	0.39	29.81	41.05	8865	12209	13065
4778	PIPP21	7005-74	9	2/15/06 0:00	Coal	UNIT 9 - A1	Base line testing - uncrushed coal	4.93	6.68	38.58	52.32	26.26	0.29	0.40	30.23	41.00	9037	12255	13132
4779	PIPP22	7005-74	9	2/15/06 0:00	Coal	UNIT 9 - A2	Base line testing - uncrushed coal	4.35	6.00	38.04	52.53	27.57	0.25	0.34	30.04	41.47	8855	12226	13006
4780	PIPP23	7005-74	9	2/15/06 0:00	Coal	UNIT 9 - B1	Base line testing - uncrushed coal	4.52	6.12	38.83	52.57	26.13	0.28	0.38	30.52	41.31	9102	12321	13124
4781	PIPP24	7005-74	9	2/15/06 0:00	Coal	UNIT 9 - B2	Base line testing - uncrushed coal	4.40	6.06	38.26	52.64	27.33	0.26	0.36	30.01	41.30	8917	12271	13063
4782	PIPP25	7005-74	7	2/16/06 0:00	Coal	UNIT 7 - A1	Base line testing - uncrushed coal	4.58	6.19	38.62	52.23	26.02	0.24	0.32	30.75	41.58	9055	12245	13053
4783	PIPP26	7005-74	7	2/16/06 0:00	Coal	UNIT 7 - A2	Base line testing - uncrushed coal	4.11	5.56	39.10	52.89	26.07	0.27	0.36	30.72	41.55	9124	12342	13069
4784	PIPP27	7005-74	7	2/16/06 0:00	Coal	UNIT 7 - B1	Base line testing - uncrushed coal	4.72	6.35	38.66	52.06	25.73	0.27	0.36	30.89	41.59	9115	12273	13105
4785	PIPP28	7005-74	7	2/16/06 0:00	Coal	UNIT 7 - B2	Base line testing - uncrushed coal	4.16	5.66	38.54	52.47	26.55	0.26	0.35	30.75	41.87	8992	12243	12978
4786	PIPP29	7005-74	8	2/16/06 0:00	Coal	UNIT 8 - A1	Base line testing - uncrushed coal	4.87	6.58	38.41	51.86	25.94	0.27	0.37	30.78	41.56	9081	12262	13126
4787	PIPP30	7005-74	8	2/16/06 0:00	Coal	UNIT 8 - A2	Base line testing - uncrushed coal	4.74	6.43	38.42	52.07	26.22	0.29	0.39	30.62	41.50	8997	12195	13033
4788	PIPP31	7005-74	8	2/16/06 0:00	Coal	UNIT 8 - B1	Base line testing - uncrushed coal	4.54	6.20	38.31	52.32	26.77	0.26	0.36	30.38	41.48	8990	12277	13088
4789	PIPP32	7005-74	8	2/16/06 0:00	Coal	UNIT 8 - B2	Base line testing - uncrushed coal	4.97	6.83	37.66	51.70	27.17	0.27	0.37	30.20	41.47	8834	12130	13019
4790	PIPP33	7005-74	9	2/16/06 0:00	Coal	UNIT 9 - A1	Base line testing - uncrushed coal	4.58	6.27	38.23	52.34	26.96	0.28	0.38	30.23	41.39	8961	12268	13089
4791	PIPP34	7005-74	9	2/16/06 0:00	Coal	UNIT 9 - A2	Base line testing - uncrushed coal	4.94	6.74	38.05	51.94	26.73	0.28	0.38	30.28	41.32	8817	12034	12904
4792	PIPP35	7005-74	9	2/16/06 0:00	Coal	UNIT 9 - B1	Base line testing - uncrushed coal	4.35	5.97	38.42	52.67	27.06	0.28	0.39	30.17	41.36	8972	12300	13081
4793	PIPP36	7005-74	9	2/16/06 0:00	Coal	UNIT 9 - B2	Base line testing - uncrushed coal	4.63	6.32	38.38	52.36	26.71	0.28	0.38	30.28	41.32	8955	12219	13043
4894	4759DU P	7005-74	7	2/14/06 0:00	Coal	UNIT 7 - A2	Duplicate of 4759	4.26	5.77	38.86	52.59	26.11	0.26	0.35	30.77	41.64	9076	12283	13035
4895	4776DU P	7005-74	8	2/15/06 0:00	Coal	UNIT 8 - B1	Duplicate of 4776	4.43	6.00	38.60	52.30	26.19	0.26	0.35	30.78	41.70	9030	12234	13015
4896	4790DU P	7005-74	9	2/16/06 0:00	Coal	UNIT 9 - A1	Duplicate of 4790	4.19	5.65	39.09	52.73	25.86	0.24	0.33	30.86	41.62	9206	12417	13161

Presque Isle Power Plant Units 7-9 Baghouse Bag Layout

Date 3/17/06

Compartment/Bank 1A

West

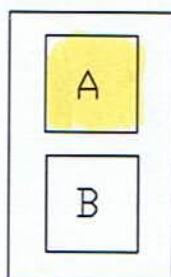
Compartment Inlet

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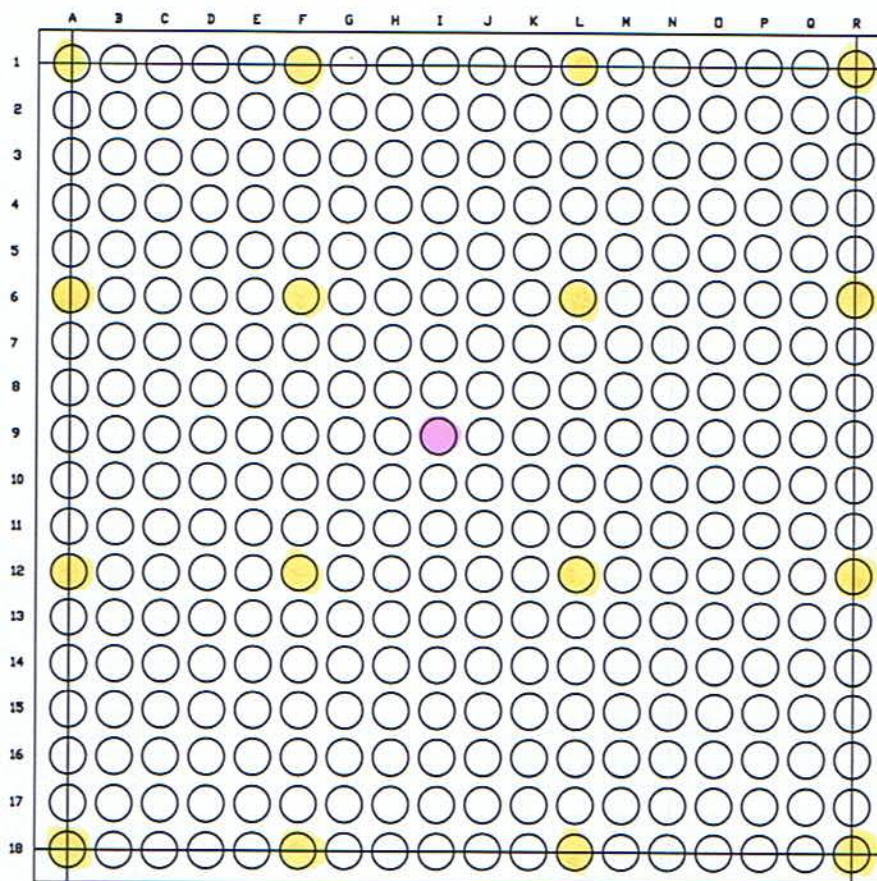
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A					
A	10	9	8	7	6
B					

Baghouse Inlet

Compartment Inlet



Compartment Inlet



East



Good bags



Bag sent out for testing

* No visible indication of damaged bags.

Presque Isle Power Plant Units 7-9 Baghouse Bag Layout

Date 3/17/06

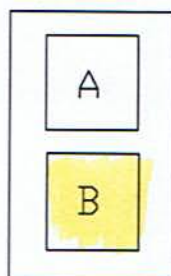
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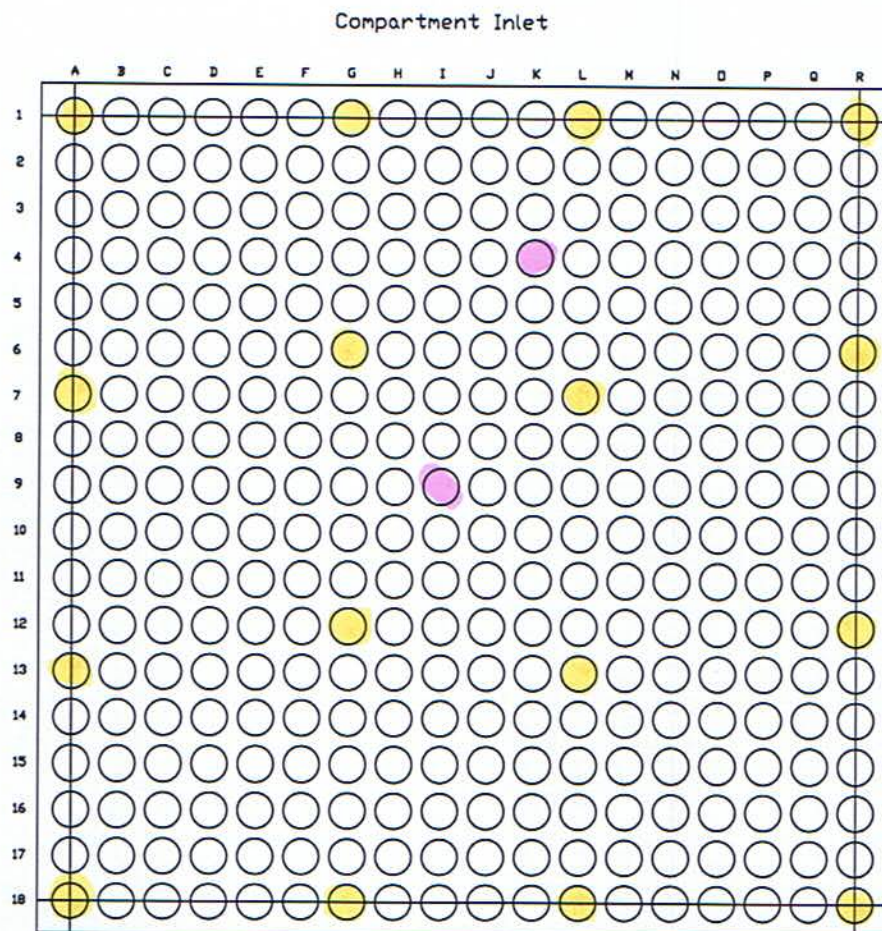
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A					
A	10	9	8	7	6
B					


Baghouse Inlet

Compartment Inlet



Compartment Inlet



 Bag were found to be good.

 Bags were sent out for testing

* No visible indication of damaged bags.

Presque Isle Power Plant Units 7-9 Baghouse Bag Layout

Date 3/20/06

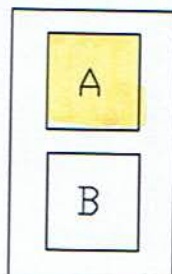
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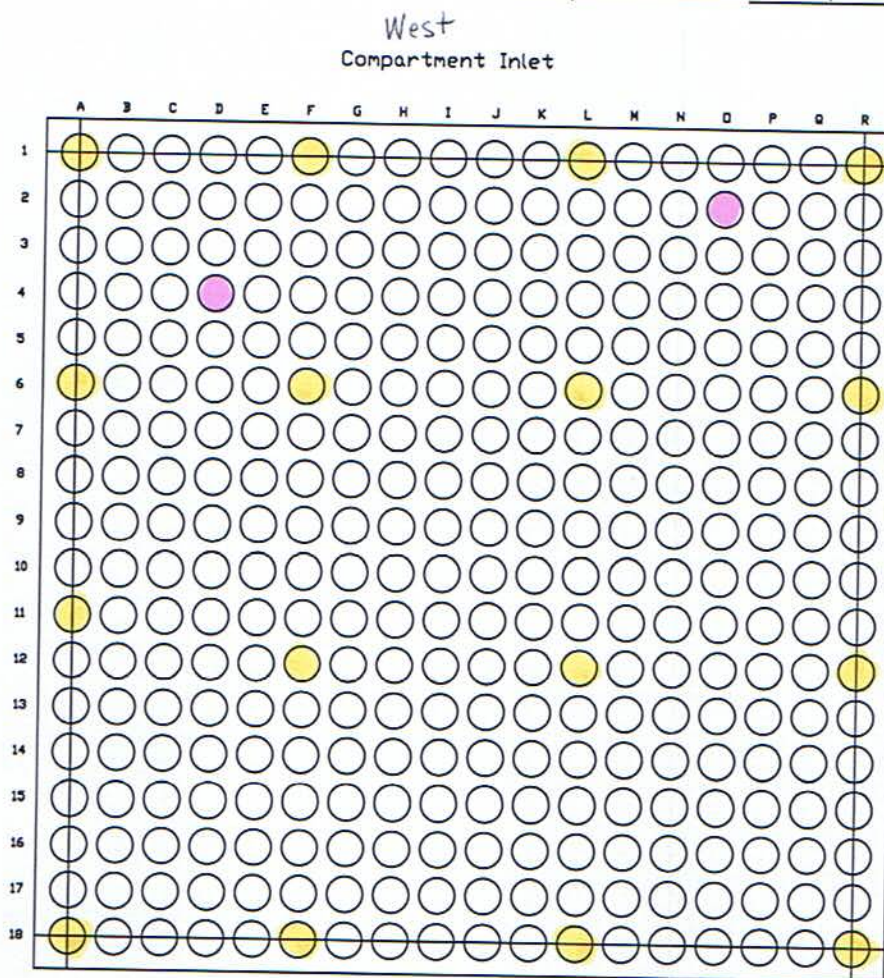
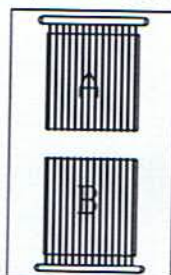
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A					
A	10	9	8	7	6
B					

Baghouse Inlet

Compartment Inlet



Compartment Inlet



GOOD BAGS



BAGS SENT OUT FOR TESTING

Presque Isle Power Plant Units 7-9 Baghouse Bag Layout

Date 3/20/06

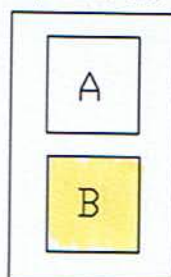
Compartment/Bank 2B

Baghouse Key:

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A					
A	10	9	8	7	6
B					

Baghouse Inlet

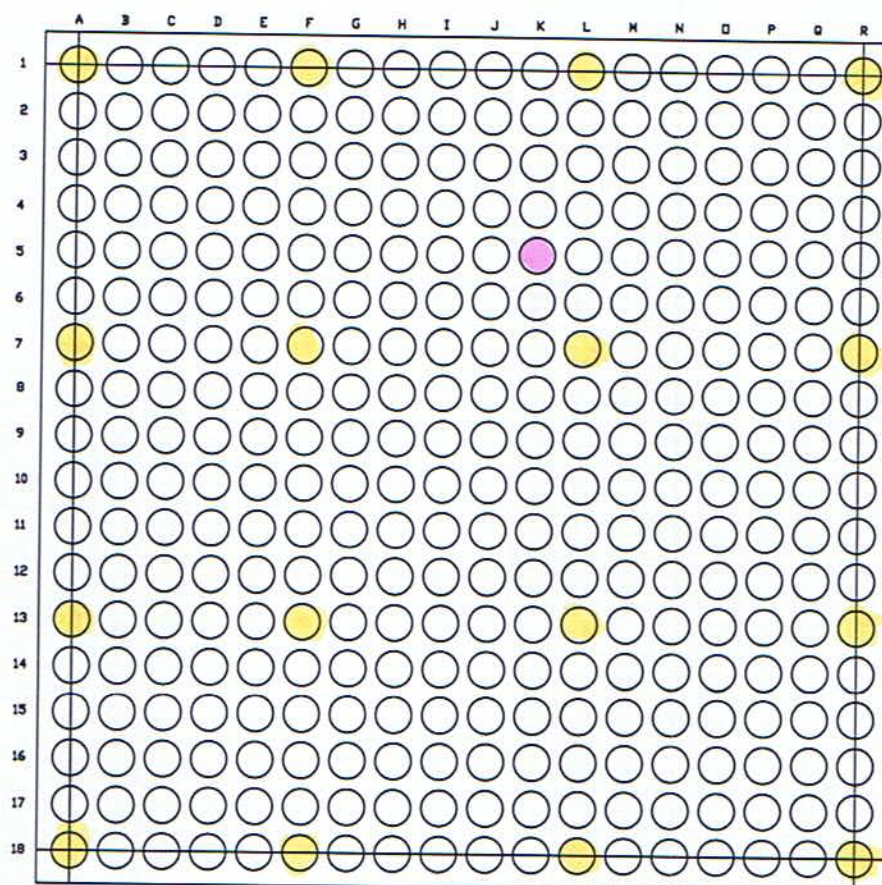
Compartment Inlet



Compartment Inlet




West
Compartment Inlet



East

 GOOD BAGS

 BAG SENT OUT FOR TESTING

Presque Isle Power Plant Units 7-9 Baghouse Bag Layout

Date 3-14-06

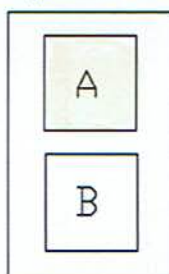
Compartment/Bank 3A

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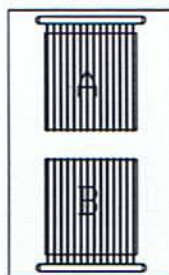
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A					
A	10	9	8	7	6
B					

Baghouse
Inlet

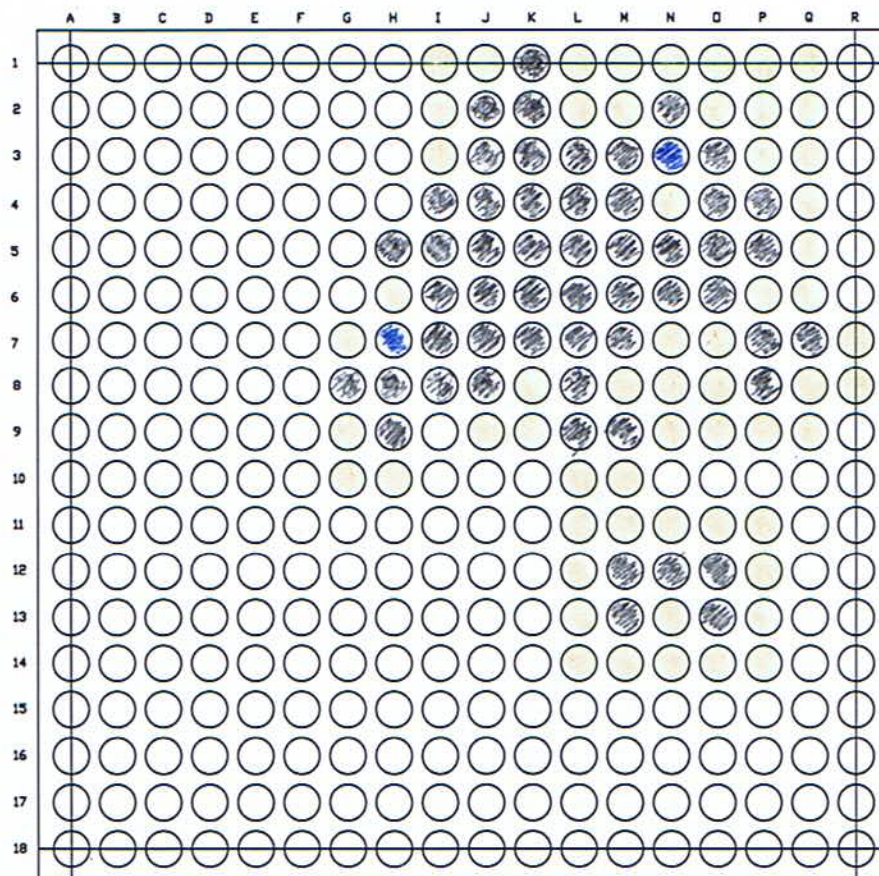
Compartment Inlet



Compartment Inlet



Compartment Inlet



Black - Bad
Yellow - Good
Blue - samples
white - not checked

Presque Isle Power Plant Units 7-9 Baghouse Bag Layout

Date 3-17-06

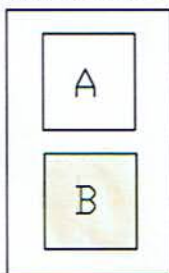
Compartment/Bank 3B

Baghouse Key:

B	5	4	3	2	1
A					
A	10	9	8	7	6
B					

Baghouse Inlet

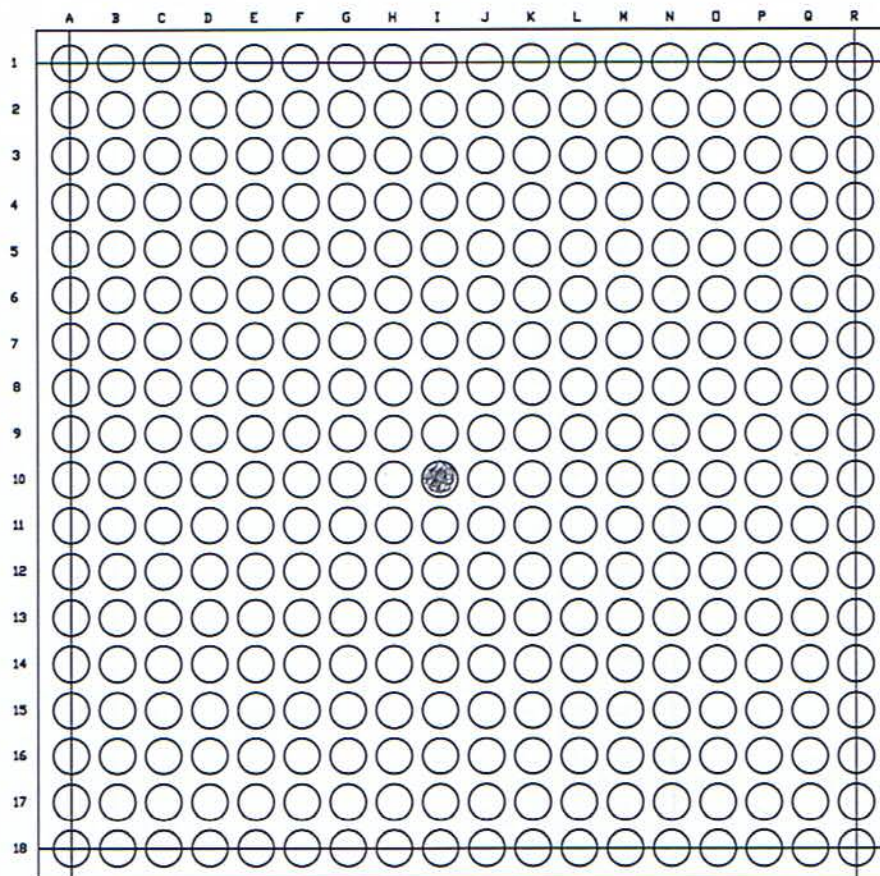
Compartment Inlet



Compartment Inlet



Compartment Inlet



3BI10 was missing bag and bottom section of cage.
Some bags were found to have smaller diameter
collars than others. Samples to be sent out.

Presque Isle Power Plant Units 7-9 Baghouse Bag Layout

Date 3/7/06

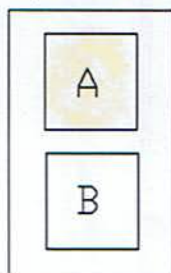
Compartment/Bank 4A

Baghouse
Key:

B	5	4	3	2	1
A					
A	10	9	8	7	6
B					

Baghouse Inlet

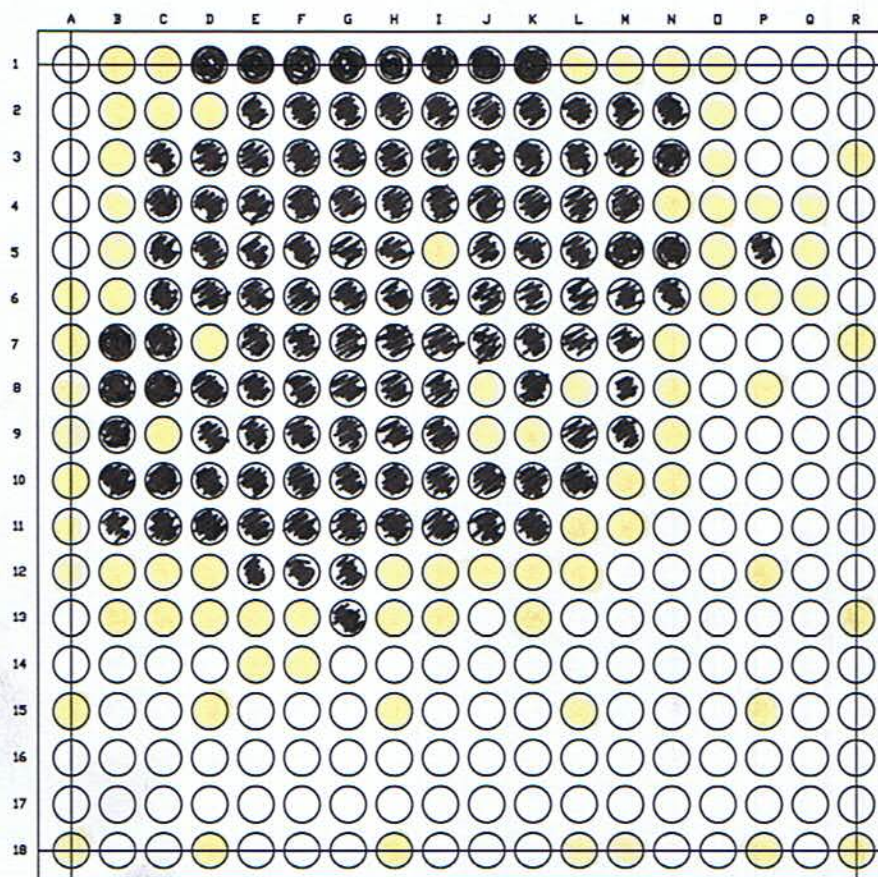
Compartment Inlet



Compartment Inlet



Compartment Inlet



Samples:

4A5M Burnt bottom
 4A6M Burnt/split up the seam
 4A9M Burnt/split up the seam
 4A2M Burnt bottom

4A8D Crisp bottom
 4A4C Crisp cuff at bottom
 4A7C Crisp cuff at bottom

Presque Isle Power Plant Units 7-9 Baghouse Bag Layout

Date 3-9-06

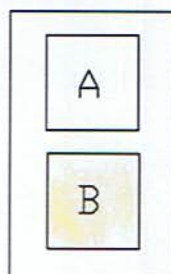
Compartment/Bank 4B

Baghouse Key:

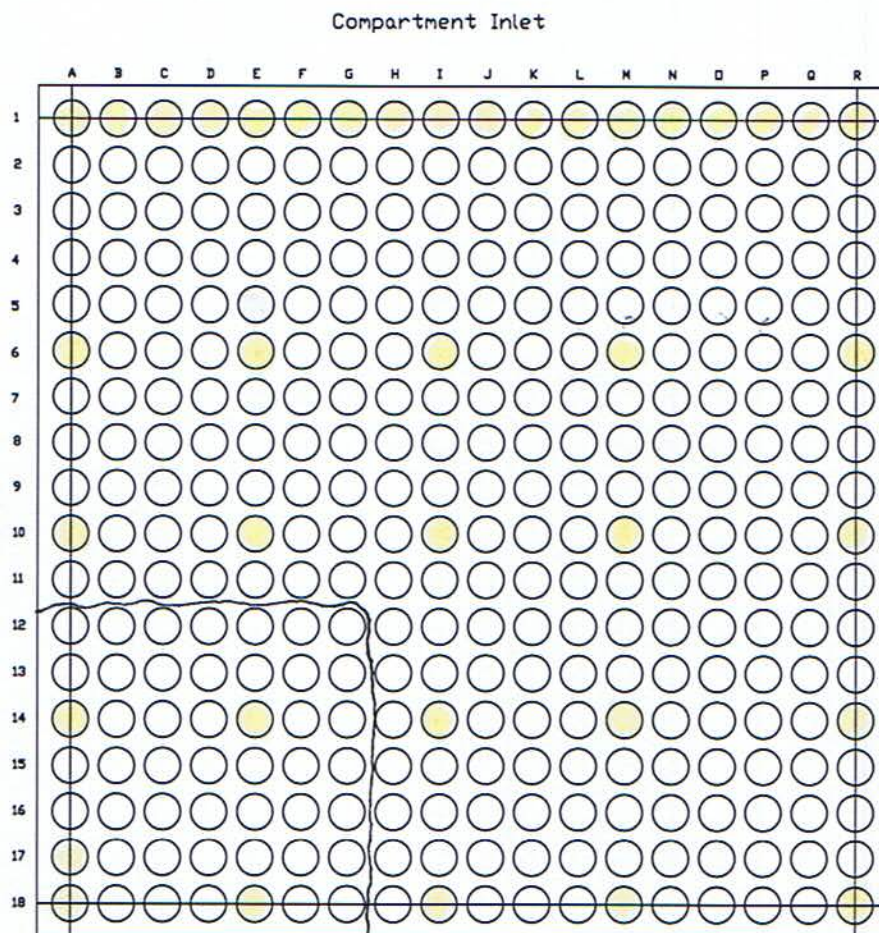
B	5	4	3	2	1
A					
A	10	9	8	7	6
B					

Baghouse Inlet

Compartment Inlet



Compartment Inlet



Area where top inside
of bags were discolored
(brown).

Sample: 4B18A was sent
out for testing

Presque Isle Power Plant Units 7-9 Baghouse Bag Layout

Date 3-16-06

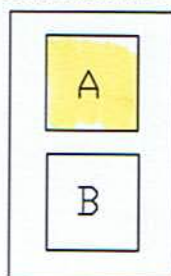
Compartment/Bank 5A

Baghouse Key:

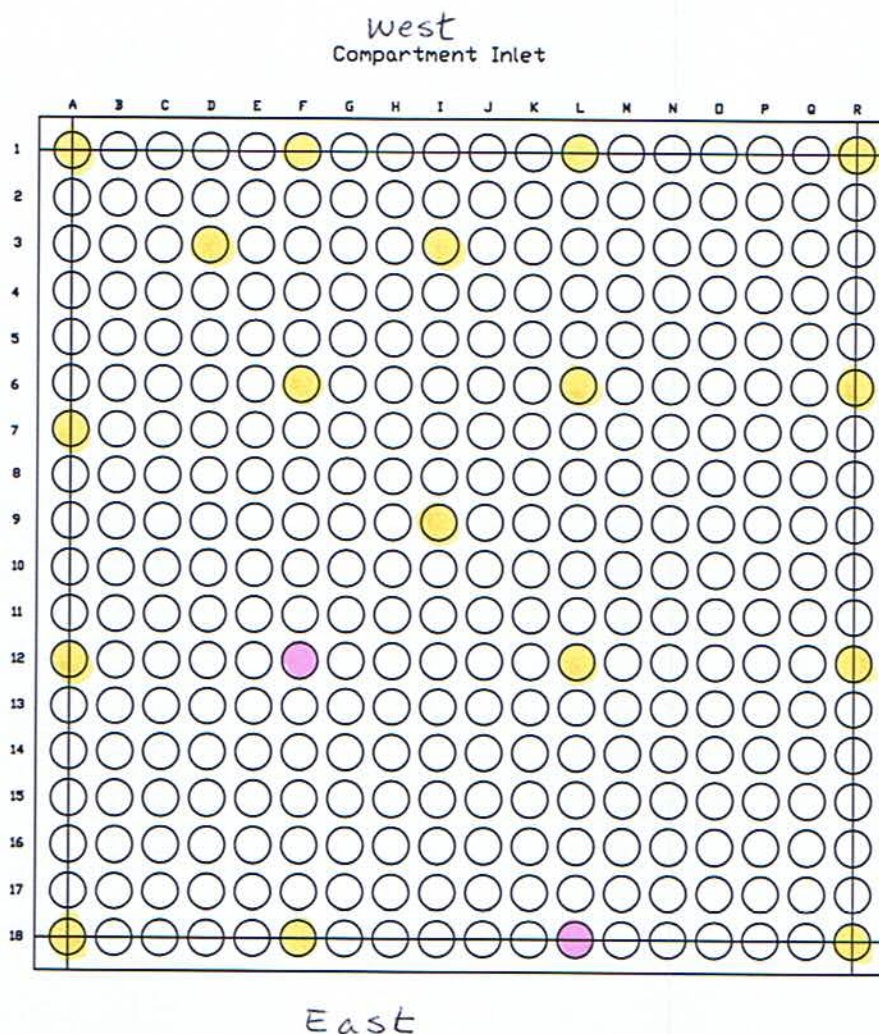
B	5	4	3	2	1
A					
A	10	9	8	7	6
B					

Baghouse Inlet


Compartment Inlet



Compartment Inlet



 Bags are good

 Bags sent for testing

* No indication of any damaged bags

Presque Isle Power Plant Units 7-9 Baghouse Bag Layout

Date 3-16-06

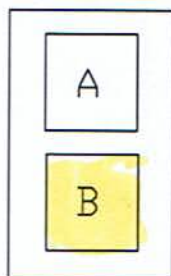
Compartment/Bank 5B

Baghouse Key:

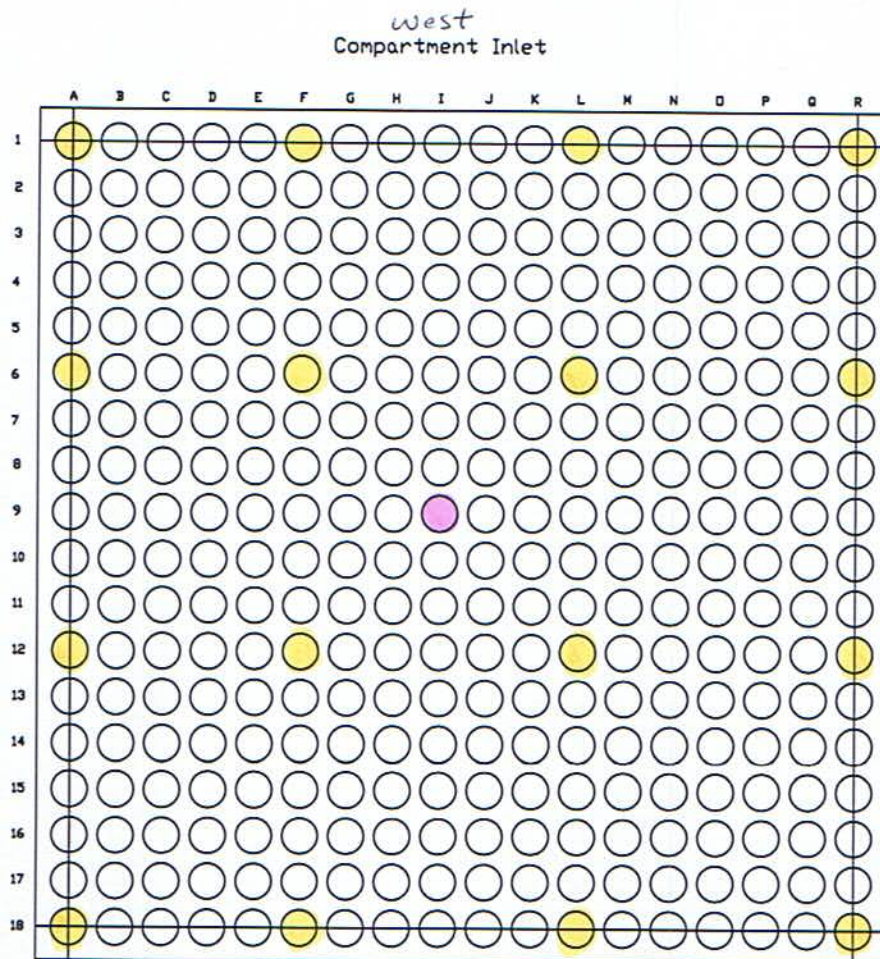
B	5	4	3	2	1
A					
A	10	9	8	7	6
B					

Baghouse
Inlet

Compartment Inlet



Compartment Inlet



Bags are good

Bag sent for testing

* No indication of any damaged bags.

Presque Isle Power Plant Units 7-9 Baghouse Bag Layout

Date 3-17-06

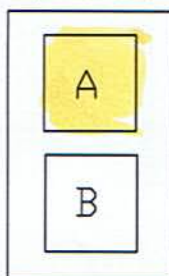
Compartment/Bank 6A

Baghouse Key:

B	5	4	3	2	1
A					
A	10	9	8	7	6
B					

Baghouse Inlet

Compartment Inlet

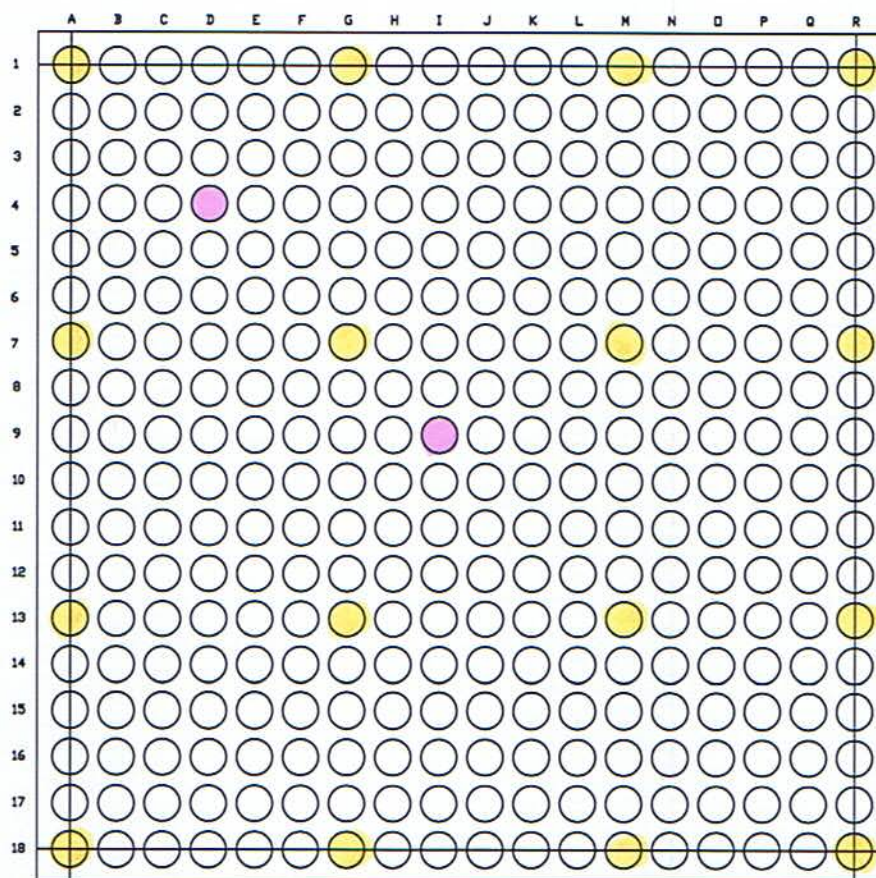


Compartment Inlet



East

Compartment Inlet



West

 Good bags

 Bags pulled for testing

* No bags were found to have failed.

Presque Isle Power Plant Units 7-9 Baghouse Bag Layout

Date 3-17-06

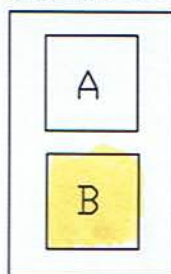
Compartment/Bank 6B

Baghouse Key:

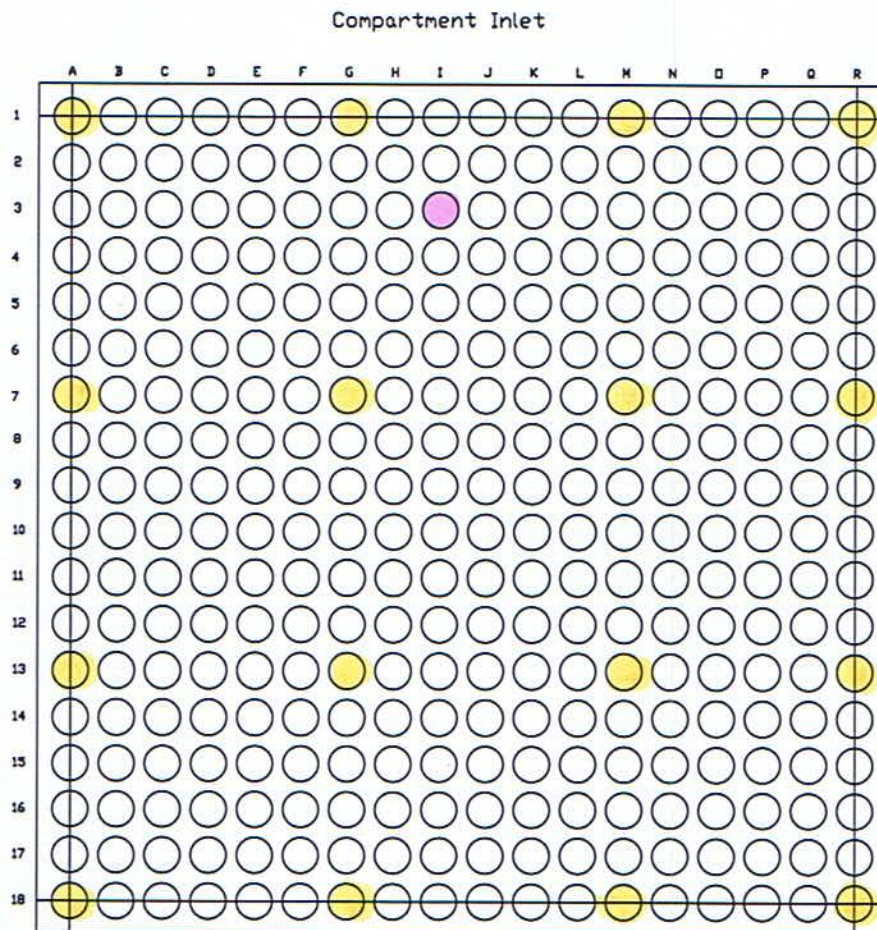
B	5	4	3	2	1
A					
A	10	9	8	7	6
B					

Baghouse Inlet

Compartment Inlet



Compartment Inlet



Good bags



Bags pulled for testing

* No bags were found to have failed

Presque Isle Power Plant Units 7-9 Baghouse Bag Layout

Date 3-16-06

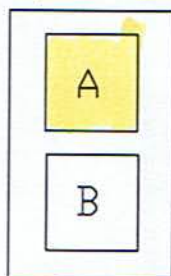
Compartment/Bank 7A

Baghouse Key:

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A					
A	10	9	8	7	6
B					

Baghouse Inlet

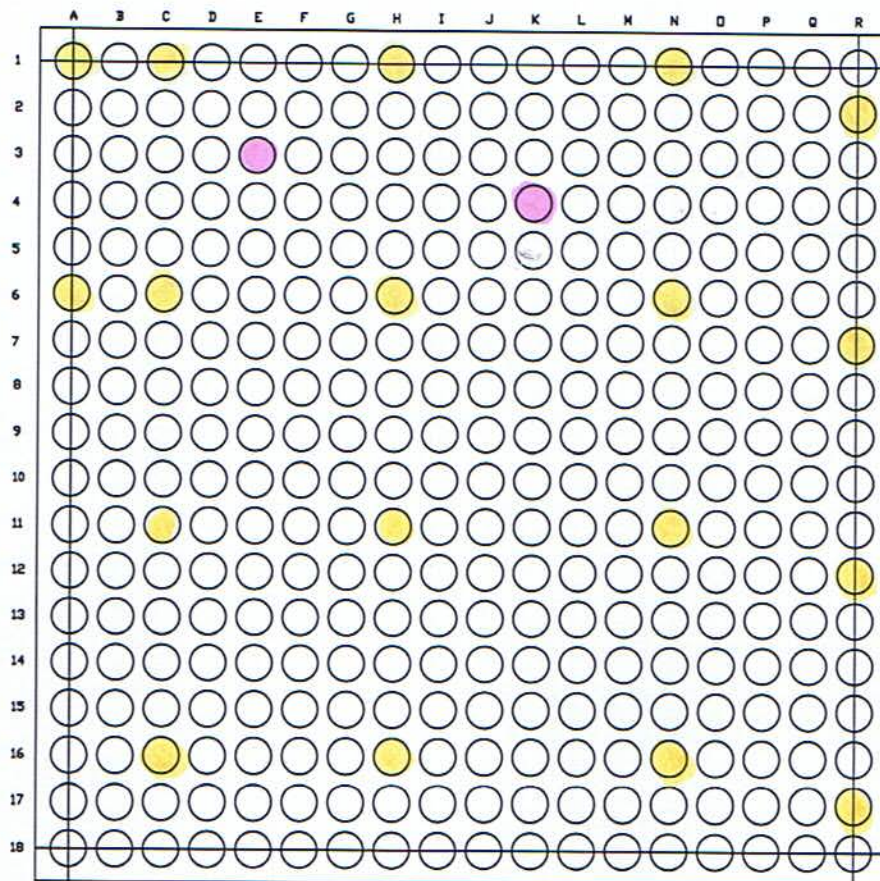
Compartment Inlet



Compartment Inlet



East
Compartment Inlet



West

Yellow - good
pink - samples
* No failed bags identified

Presque Isle Power Plant Units 7-9 Baghouse Bag Layout

Date 3-16-06

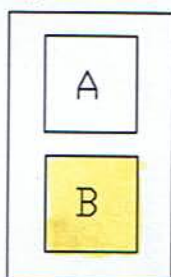
Compartment/Bank 7B

Baghouse Key:

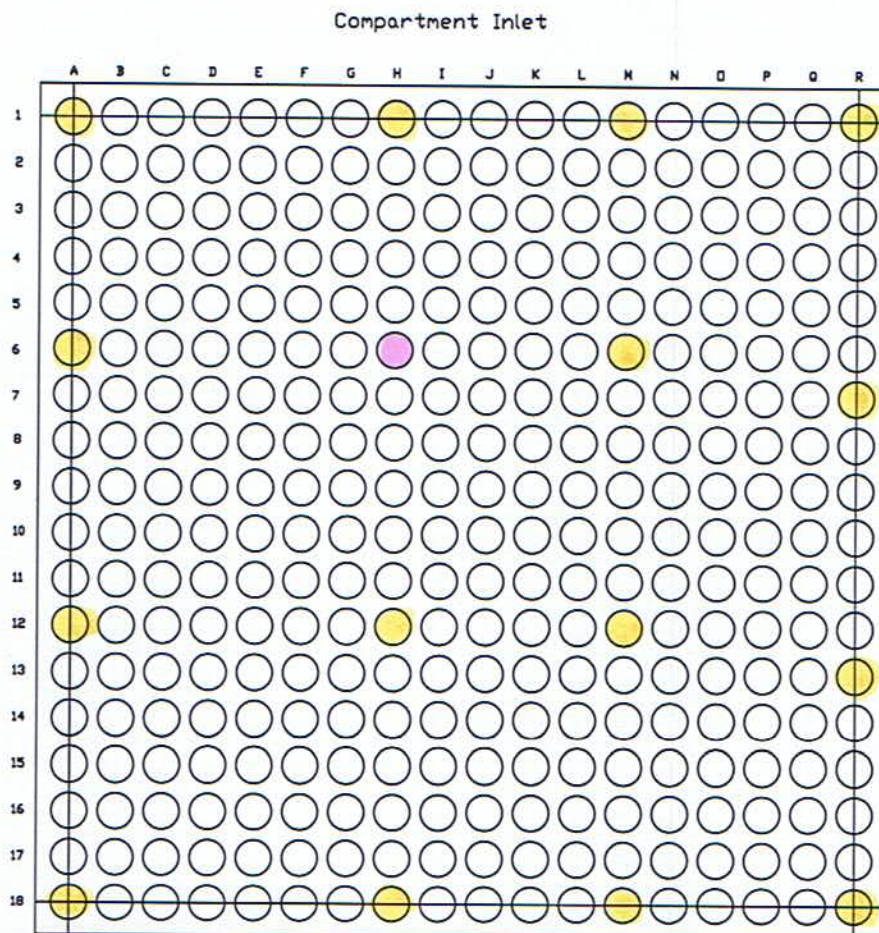
B	5	4	3	2	1
A					
A	10	9	8	7	6
B					

Baghouse Inlet

Compartment Inlet



Compartment Inlet



Yellow - Good



Pink - sample bag

* No failed bags identified

Presque Isle Power Plant Units 7-9 Baghouse Bag Layout

Date 3/21/06

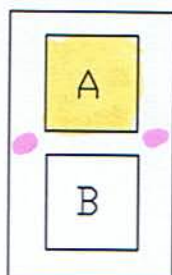
Compartment/Bank 8A

Baghouse
Key:

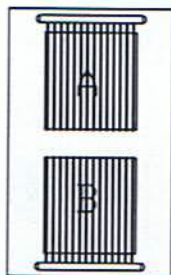
B	5	4	3	2	1
A					
A	10	9	8	7	6
B					

Baghouse Inlet

Compartment Inlet



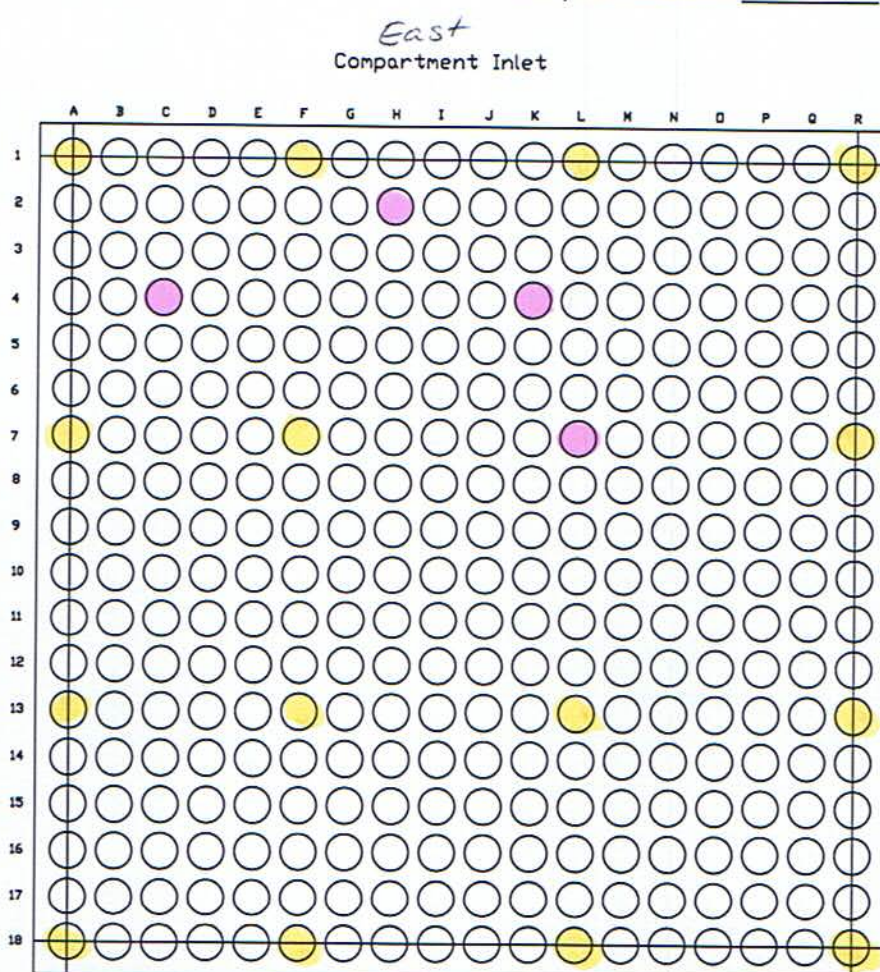
Compartment Inlet



swatch

West

swatch



 GOOD BAGS

 BAG SENT FOR TESTING

L7: stuck to cage. Had to be cut from cage

K4: P84 bag removed

Presque Isle Power Plant Units 7-9 Baghouse Bag Layout

Date 3/21/06

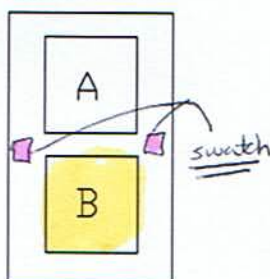
Compartment/Bank 8B

Baghouse
Key:

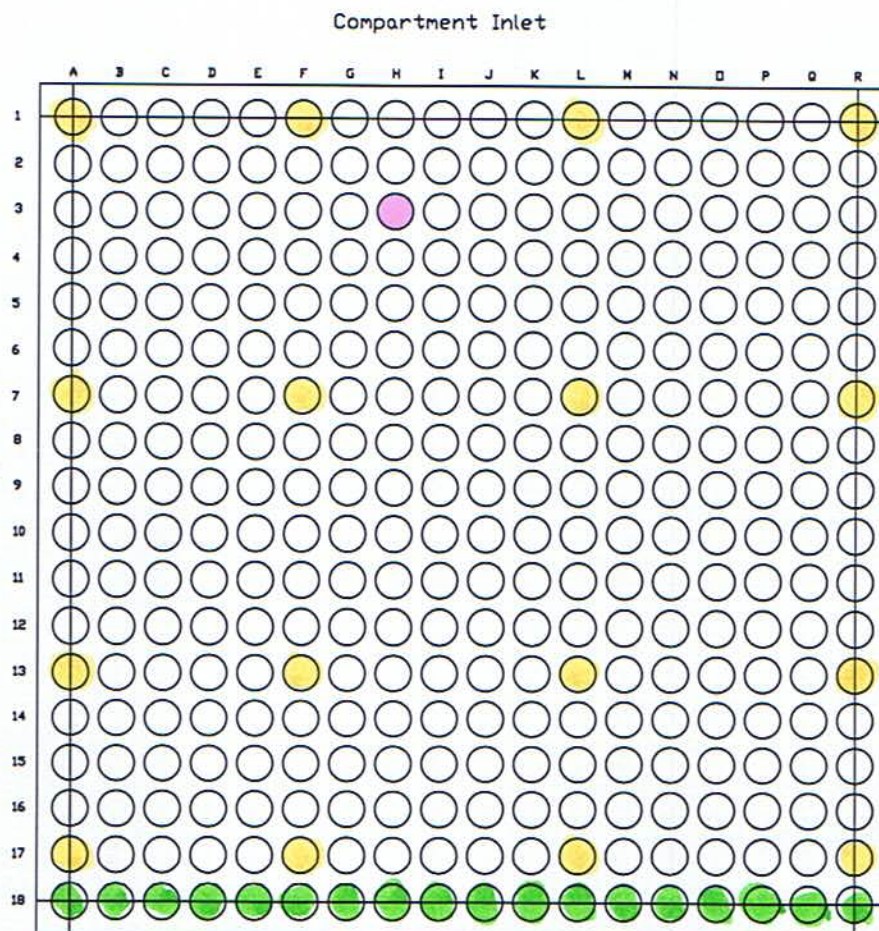
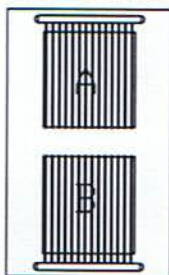
B	5	4	3	2	1
A					
A	10	9	8	7	6
B					

Baghouse Inlet

Compartment Inlet



Compartment Inlet



GOOD BAGS

BAG SENT FOR TESTING

Row 18 stiff - could not pull out
because of moisture/corrosion.

Presque Isle Power Plant Units 7-9 Baghouse Bag Layout

Date 3/20/06

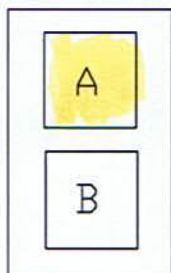
Compartment/Bank 9A

Baghouse Key:

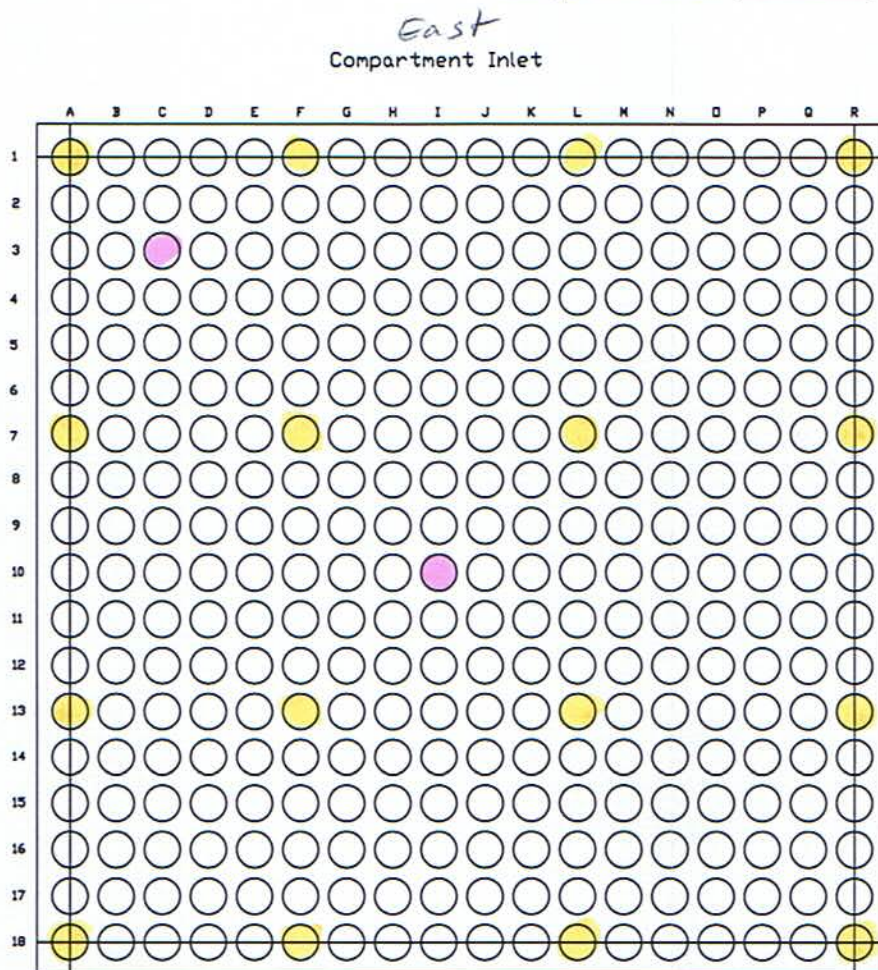
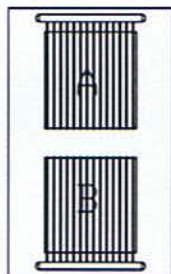
B	5	4	3	2	1
A					
A	10	9	8	7	6
B					

Baghouse Inlet

Compartment Inlet



Compartment Inlet



Good bags



Bags sent to be tested

* No indication of bad bags.

Presque Isle Power Plant Units 7-9 Baghouse Bag Layout

Date 3/20/06

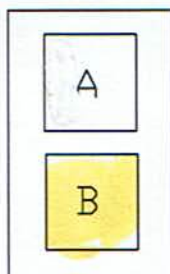
Compartment/Bank 9B

Baghouse Key:

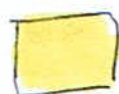
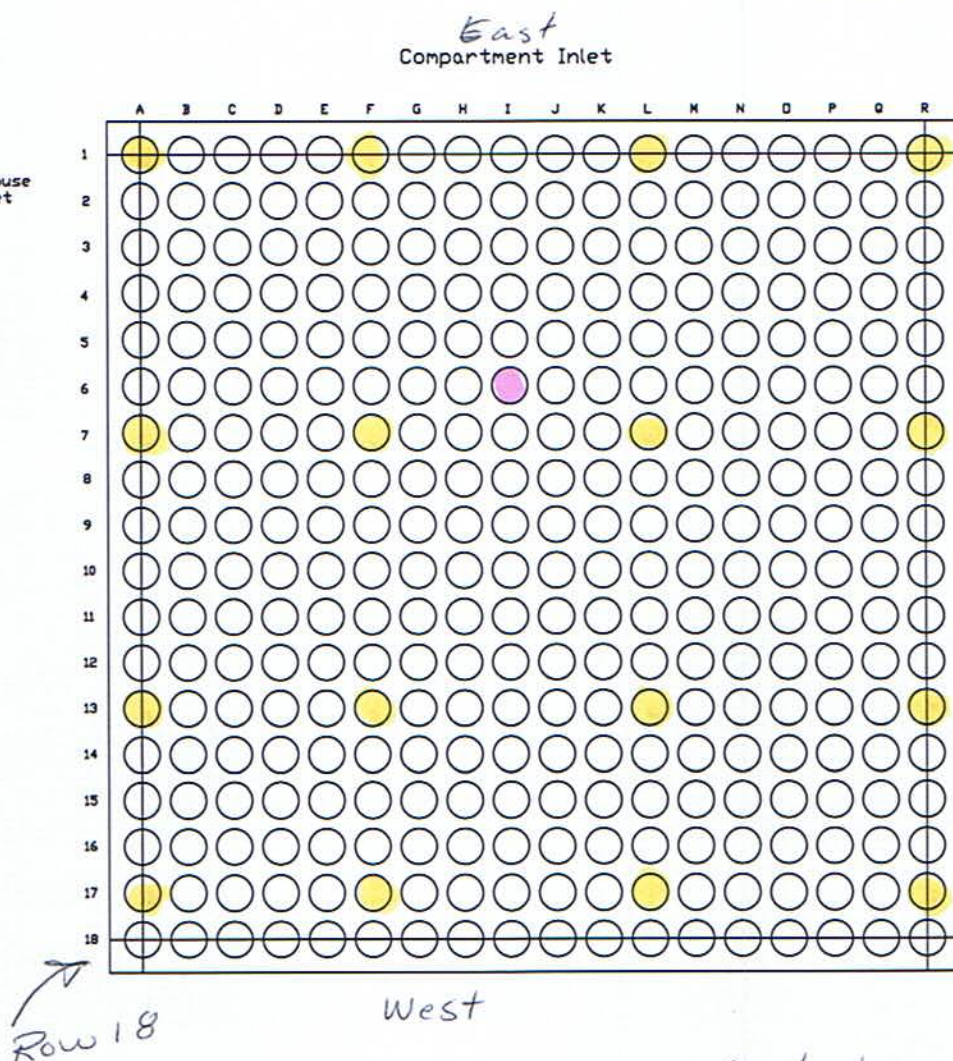
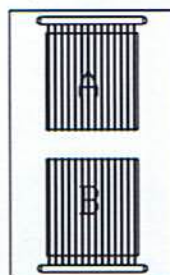
B	5	4	3	2	1
A					
A	10	9	8	7	6
B					

Baghouse Inlet

Compartment Inlet



Compartment Inlet



Bags were found to be good



Bag sent out for sampling

* No indication of bad bags

Row 18 cages were difficult to lift from bags. Appears to be caused by "J" tube condensate.

Presque Isle Power Plant Units 7-9 Baghouse Bag Layout

Date 3/17/06

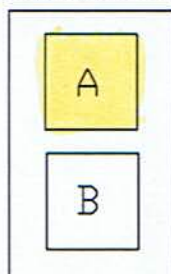
Compartment/Bank 10A

Baghouse Key:

B	5	4	3	2	1
A					
A	10	9	8	7	6
B					

Baghouse Inlet

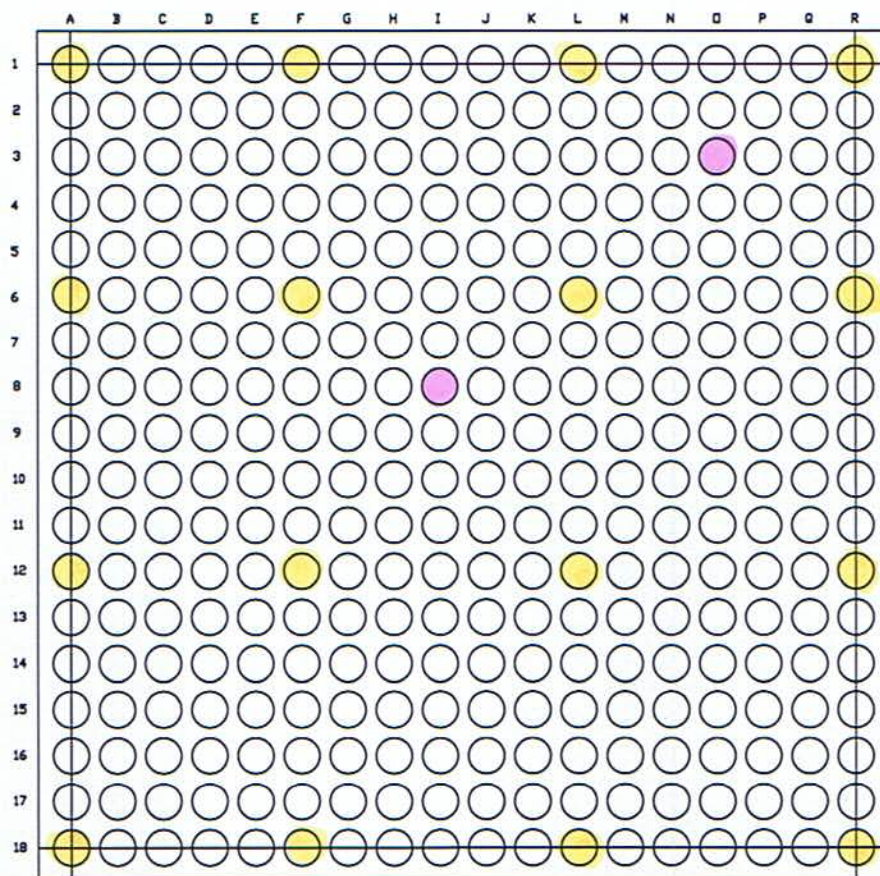
Compartment Inlet



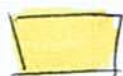
Compartment Inlet



East
Compartment Inlet



West



Good bags



Bags pulled (+ to be sent for testing)

* No indication of damaged bags.

Presque Isle Power Plant Units 7-9 Baghouse Bag Layout

Date 3/17/06

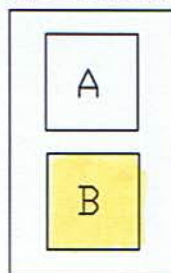
Compartment/Bank 10B

Baghouse Key:

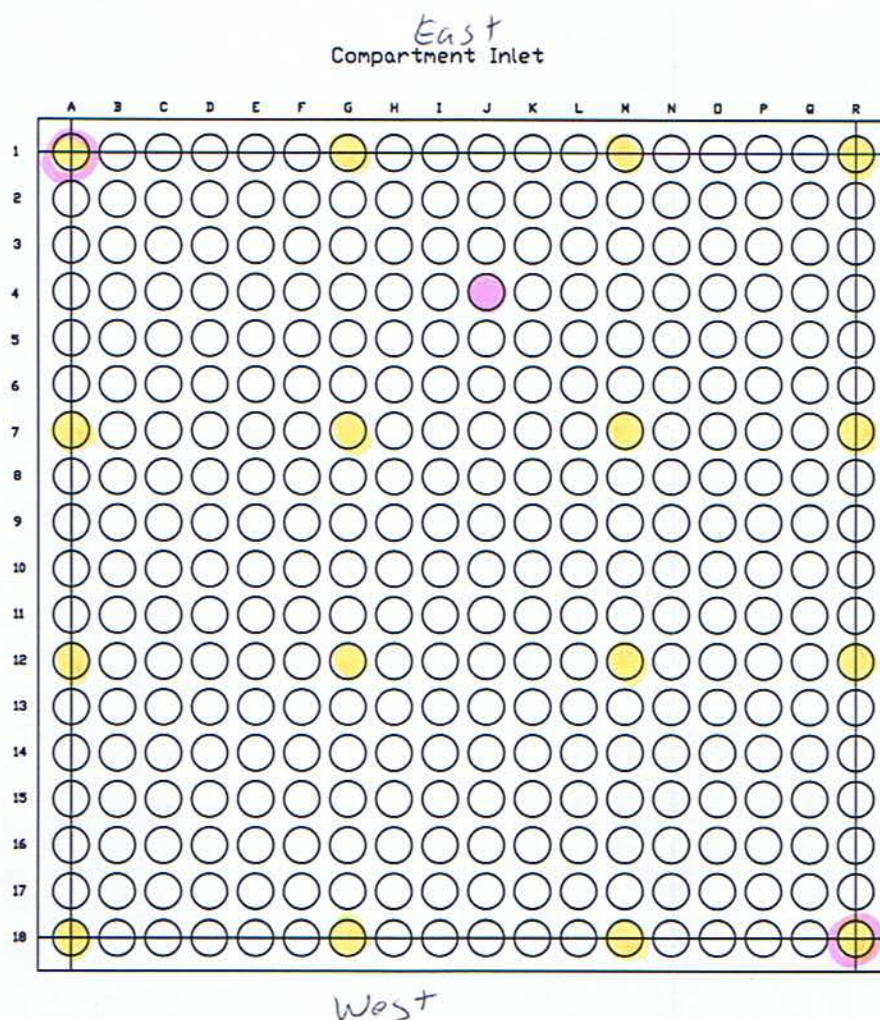
B	5	4	3	2	1
A					
A	10	9	8	7	6
B					

Baghouse Inlet


Compartment Inlet




Compartment Inlet



 Good bags

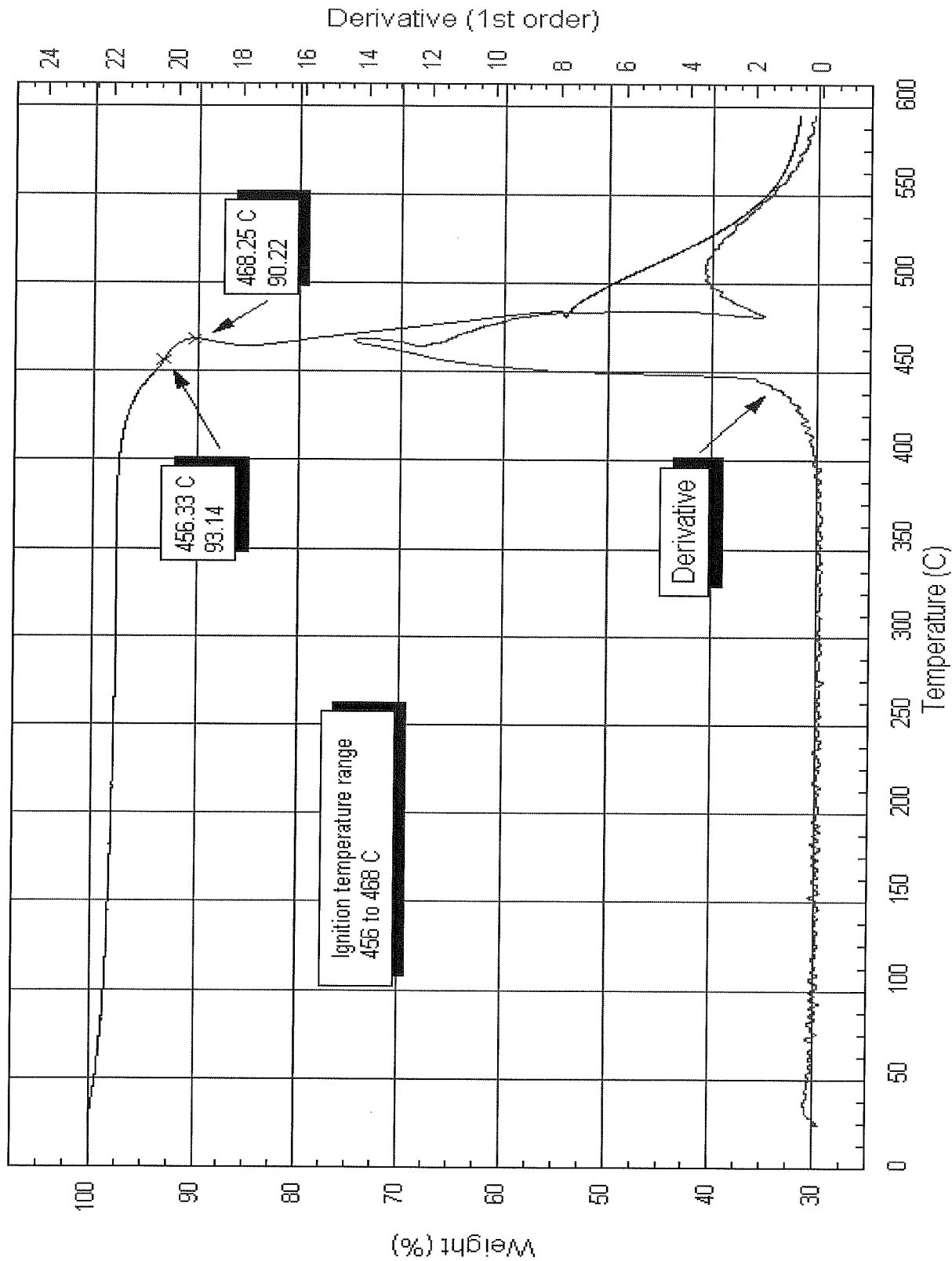
 Bag sent out for testing

 Bags were replaced because cages were separated and the only way to remove cage was to cut the bag.

Note: Rows 10-18 cages were real tight to inside of bags.

File Name: Act Carbon.001.TGA
Size: 10.859
Desc. 1 : ADA-ES Activated Carbon
Desc. 2 : Purge = Air at 50 cc/min

Operator: HM
Date: 03/06/2006
Time: 13:10:59
Instrument: TGA 951

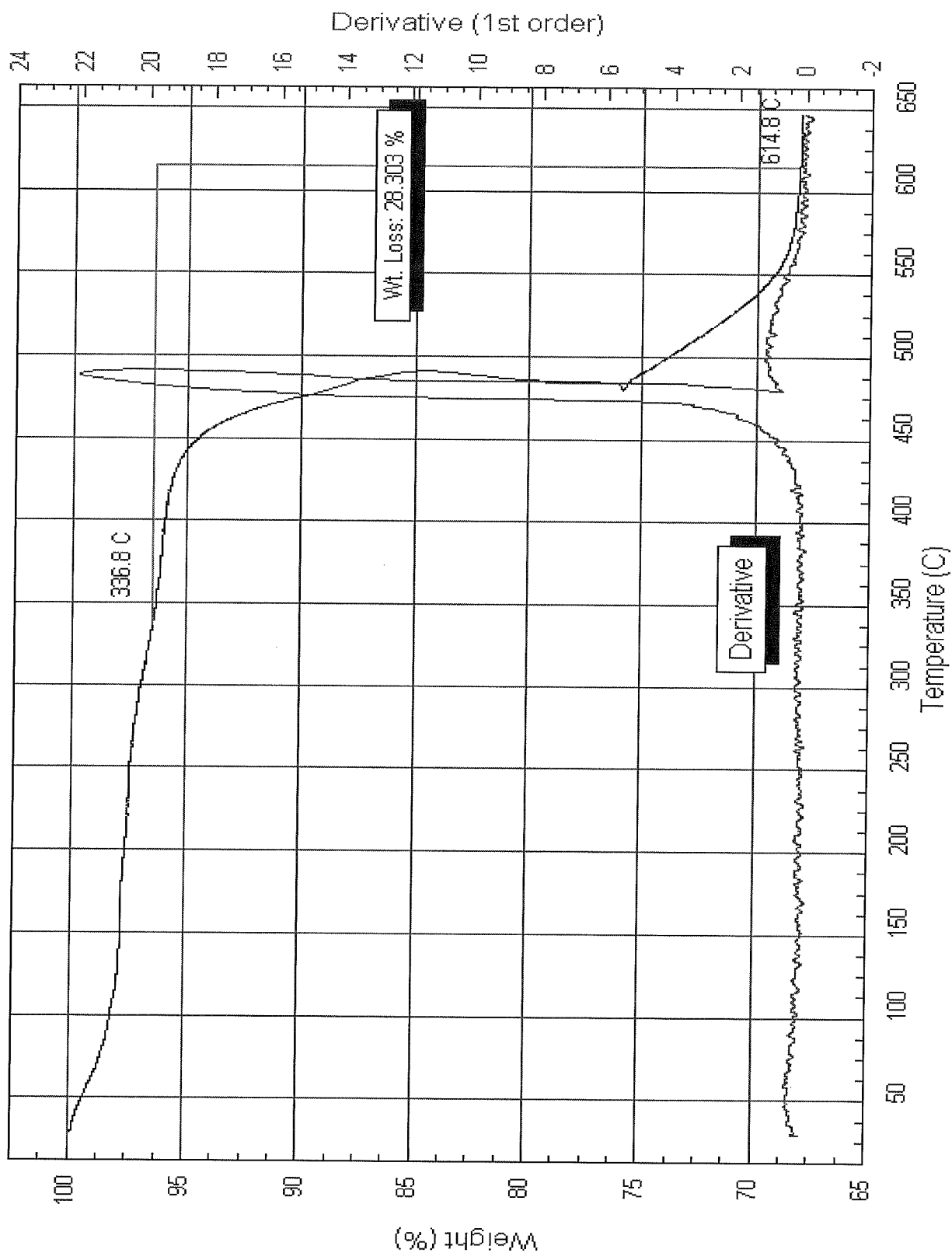




Hazen Research, Inc

File Name: BH-4_2-27_002.TGA
Size: 10.432
Desc. 1 : ADA-ES; BH-4, 2-27-06
Desc. 2 : Purge = Air at 50 cc/min; HR = 10 C/min

Operator: HM
Date: 03/08/2008
Time: 13:02:43
Instrument: TGA 951





Hazen Research, Inc

File Name: BH-4_2-24-001.TGA
Size: 10.295
Desc. 1 : ADA-ES; BH-4_2-24-06
Desc. 2 : Purge = Air at 50 cc/min; HR = 10 C/min

Operator: HM
Date: 03/08/2006
Time: 07:16:48
Instrument: TGA 951

